Regulation & Syllabus

MSc FORENSIC ODONTOLOGY
2023

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

1. PROGRAM OBJECTIVES

- Forensic odontology masters course aims to train the students in proper handling and examination of dental evidences, proper evaluation and presentation of dental findings in the court of law in the interest of justice.
- It exposes the students to various crime scene scenarios, moot court and laboratory work to again hands on skills along with theoretical knowledge to enhance practical judgment and abilities in carrying out the forensic case work.
- To Practice the specialty efficiently and effectively, backed by scientific knowledge and skill.

2. PROGRAM OUTCOMES

Upon completion of this course, the graduate should be able to:

- Determine the age, sex and stature of both the living and deceased.
- Collect, preserve and analyze odontological evidences retrieved from the crime scene
- Identify unknown human remains (DVI) through dental records and craniofacial bones.
- Elicit the ethnicity and assisting in building up picture of lifestyle and diet of skeletal remains
- Understand the concepts and methodology involved in the examination, analysis, and , the comparison of human bite marks, lip prints and rugae pattern
- Detect domestic, sexual and child abuse in dental practice environment.
- Presenting evidence in court as expert witness.

3. CAREER PROSPECTS

There are immense job and research opportunities for forensic odontologists in India and abroad. The disciplines within the forensic odontology profession have expanded beyond dental identifications to include recognition and reporting of child and elder abuse, age assessment, and bitemark analysis. Forensic Odontologists are called to assist the courts in resolution of civil litigation disputes involving violation of the standard of care and cases involving potential insurance fraud. Forensic services by Odontologists to identify victims and perpetrators usually by examining and comparing dental records with human remains and pattern injuries such as bite marks are at a high demand in both Central and State forensic science laboratories, Central/State Disaster Management Teams, aviation sector, as natural disasters like earthquakes, floods and air crashes occur resulting in mass fatalities. Forensic odontologists perform examinations required by medical examiners, law enforcement and judicial agencies and can become consultants for law firms, crime labs, legal organizations working for disaster management, insurance agencies, and armed forces etc,

4. ELIGIBILITY FOR ADMISSION

A candidate seeking admission to the Master of Science Degree in Forensic Odontology must have passed B. Sc in Forensic Science / BDS / MBBS from a recognized Institution.

5. INTAKE CAPACITY

Per semester intake capacity is 10 seats

6. DURATION OF THE COURSE
The course of study shall be for a period of 2 academic years (4 semesters)

7. MEDIUM OF INSTRUCTION
The Medium of instruction and examination shall be in English.

8. METHOD OF TRAINING
Training will include involvement in theory, tutorials, laboratory & experimental work and research studies, Self- learning material, Seminars, assignments, group discussions, journal club presentations.

9. ATTENDANCE
Candidates should have attended at least 80% of the total number of classes conducted from the date of commencement of the semester to the last working day, as notified by the JSS Academy of Higher Education and Research (JSSAHER), in each of the subjects prescribed for that semester, separately in theory and practical, to be eligible to appear for the examinations. Candidates lacking prescribed percentage of attendance in any subject shall not be eligible to appear for the JSSAHER examination in that subject.

10. Course of study

Subjects and hours of teaching for theory, practical
The number of hours of teaching theory and practical, semester wise are shown in table I,II,III,IV & V

Bridge Course for Non -Medical Professionals.

TABLE I

For BSc Forensic Science graduates, training will be provided through bridge course in basic science subjects

BRIDGE COURSE			
THEORY			
CORE 1	ANATOMY	15	01
CORE 2	PHYSIOLOGY	15	01
CORE 3	BIO CHEMISTRY	15	01
	TOTAL	45	03

TABLE II

I Semester			
THEORY		Hrs.	CREDITS
Core 1	Section A - DENTAL JURISPRUDENCE Section B - FORENSIC SCIENCE	30 30	02 02
Core 2	DENTAL ANATOMY AND ORAL EMRYOLOGY	60	04
Core 3	Section A - General Pathology Section B – General Microbiology	15 15	01 01
Core 4	RESEARCH METHODOLOGY AND BIO ETHICS	30	02
PRACTICALS			
Module 1	Section A - DENTAL JURISPRUDENCE SEC B - FORENSIC SCIENCE	15 15	01 01
Module 2	DENTAL ANATOMY AND ORAL EMRYOLOGY	45	03
Module 3	Section A - General Pathology Section B – General Microbiology	15 15	01 01
	Seminar + Project	15	01
TOTAL		300	20

TABLE III

II SEMESTER			
THEORY		Hrs.	CREDITS
Core 1	Section A - Dental Materials & Applied aspects Section B - Oral Pathology & Applied aspects	30 30	02 02
Core 2	Oral Radiology & Applied aspects	60	04
Core 3	Forensic Anthropology	45	03
Core 4	Biostatistics	30	02
PRACTICALS			
Module 1	Section A -Dental Materials & Applied aspects Section B - Oral Pathology & Applied aspects	15 15	01 01
Module 2	Oral Radiology & Applied aspects	30	02
Module 3	Forensic Anthropology	30	02
	Seminar + Project	15	01
	Total	300	20

TABLE IV

III SEMESTER			
THEORY		Hrs.	CREDITS
Core 1	Forensic Odontology	60	04
Core 2	Pedodontics & Applied Aspects	60	04
Core 3	Applied Forensic Medicine & Toxicology	60	04
Elective	A. DNA Typing Or B. Humanitarian Forensics	15	01

PRACTICALS			
Module 1	Forensic Odontology	30	02
Module 2	Pedodontics & Applied Aspects	30	02
Module 3	Applied Forensic Medicine & Toxicology	30	02
Seminar + Project		15	01
Total		300	**20**

TABLE V

IV Semester		
Course Work	Hrs.	CREDITS
Dissertation Work	210	14 Credits
Mortuary Posting	45	03 Credits
Publications & Conference Presentations	30	02 Credits
Seminar + Pedagogy	15	01 Credits
Total	300	**20 Credits**

TOTAL COURSE CREDITS

FOR MEDICAL GRADUATES

SEMESTER	CREDITS
Semester 1	20
Semester 2	20
Semester 3	20
Semester 4	20
Total Course Credits	**80**

FOR NON- MEDICAL GRADUATES

SEMESTER	CREDITS – Medical Professionals	CREDITS- Non Medical professional courses
Bridge course	------	03
I Sem	20	20
II Sem	20	20
III Sem	20	20
IV Sem	20	20
Total	80	83

3. Monitoring of Progress in Studies

A. Internal Assessment

Internal assessment will be conducted to assess knowledge, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system for core papers and practical modules.

- In Each Semester Two internal assessment (IA) will be conducted for 50 marks in each subject. The distribution of marks is as follows

THEORY			
TYPE OF QUESTIONS	**Number of questions**	**Marks for each question**	**Total**
Long essay	**2**	**10**	**20**
Short answer	**5**	**6**	**30**
Total			**50**

- IA Practical exam will be conducted for 50 marks, 40 marks for practical exercises and 10 marks for viva-voce

If the candidate is absent for any of the IA examination due to genuine and satisfactory reason, such a candidate may be given a re-examination within a fortnight.

Minimum 50% marks is required in theory and practical separately in each paper to be eligible to write end semester examinations

B. End semester Examination (Summative Assessment)

Examination for Bridge course - Theory examination will be conducted at the end of the bridge course for Anatomy, Physiology and Biochemistry subjects - will be an Internal exam

Pattern of Question Paper

THEORY			
TYPE OF QUESTIONS	**Number of questions**	**Marks for each question**	**Total**
Long essay	**03**	**10**	**30**
Short Note	**10**	**05**	**50**
Short Answer	**10**	**02**	**20**
Total			**100**

JSSAHER examinations for core papers and practical modules – The JSSAHER shall conduct examination for core papers and practical modules at the end of each semester. The candidates, who satisfy the requirement of attendance and internal assessment, shall be eligible to appear for the JSSAHER Examination. The head of the institution shall verify the same before forwarding the applications to the controller of examinations (COE) JSSAHER within stipulated time along with the prescribed fee.

Exam pattern

Evaluation
Examinations- FIRST SEMESTER

Core	Paper	Max. Internal Marks	Max. University Marks	Total Maximum Marks	Minimum Marks to Pass
Core 1	Section A - DENTAL JURISPRUDENCE Section B - FORENSIC SCIENCE	20 (10 + 10)	80 (40 + 40)	100	50 (25 + 25)
Core 2	DENTAL ANATOMY AND ORAL EMRYOLOGY	20	80	100	50
Core 3	Section A - General Pathology Section B – General Microbiology	20 (10 + 10)	80 (40 + 40)	100	50 (25 + 25)
Core 4	RESEARCH METHODOLOGY AND BIO ETHICS	20	80	100	50

Practical Module	Practical	Max. Internal Marks	Max. University Marks	Maximum Marks	Minimum Marks to Pass
Module 1	Section A - DENTAL JURISPRUDENCE SEC B - FORENSIC SCIENCE	20 (10 + 10)	80 (40 + 40)	100	50 (25 + 25)
Module 2	DENTAL ANATOMY AND ORAL EMRYOLOGY	10	40	50	25
Module 3	Section A - General Pathology Section B – General Microbiology	20 (10 + 10)	80 (40 + 40)	100	50 (25 + 25)

SECOND SEMESTER

Core	Paper	Max. Internal Marks	Max. University Marks	Total Maximum Marks	Minimum Marks to Pass
Core 1	Section A - Dental Materials & Applied aspects Section B - Oral Pathology & Applied aspects	20 (10 + 10)	80 (40 + 40)	100	50 (25 + 25)
Core 2	Oral Radiology & Applied aspects	20	80	100	50
Core 3	Forensic Anthropology	20	80	100	50
Core 4	Biostatistics	20	80	100	50

Practical Module	Practical	Max. Internal Marks	Max. University Marks	Maximum Marks	Minimum Marks to Pass
Module 1	Section A -Dental Materials & Applied aspects Section B - Oral Pathology & Applied aspects	20 (10 + 10)	80 (40 + 40)	100	50 (25 + 25)
Module 2	Oral Radiology & Applied aspects	10	40	50	25
Module 3	Forensic Anthropology	10	40	50	25

THIRD SEMESTER

Core	Paper	Max. Internal Marks	Max. University Marks	Total Maximum Marks	Minimum Marks to Pass
Core 1	Forensic Odontology	20	80	100	50
Core 2	Pedodontics & Applied Aspects	20	80	100	50
Core 3	Applied Forensic Medicine & Toxicology	20	80	100	50
Core 4	C. DNA Typing Or D. Humanitarian Forensics	20	80	100	50

Practical Module	Practical	Max. Internal Marks	Max. University Marks	Maximum Marks	Minimum Marks to Pass
Module 1	Forensic Odontology	10	40	50	25
Module 2	Pedodontics & Applied Aspects	10	40	50	25
Module 3	Applied Forensic Medicine & Toxicology	10	40	50	25

IV SEMESTER

Course work	Max. Internal Marks	Max. University Marks	Total Maximum Marks	Minimum Marks to Pass
Dissertation Presentation	--	200	200	100
Dissertation Viva Voce	--	200	200	100
Seminar + Pedagogy	100	--	100	50

* Note - Each candidate must present 5 seminars and engage 5 pedagogy classes which will be graded on the respective checklist for 10 marks each

Theory Examination: – 3 hours paper, 80 marks for each core paper

PATTERN OF THEORY QUESTION PAPER

THEORY (for 80 marks paper)			
Type of questions	**Marks**	**No of Questions**	**Total marks**
Long essay	**10**	02	**20**
Short essay	05	10	**50**
Short answers	**02**	05	**10**
	Total Marks		**80**

THEORY (for 40 marks paper eg sec A / sec B)			
Type of questions	**Marks**	**No of Questions**	**Total marks**
Long essay	**10**	01	**10**
Short essay	06	05	**30**
	Total Marks		**40**

Practical Examination:
Practical examination 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: Practical examination will be conducted for 40 marks in each paper, of which 30 marks is for practical exercises and 10 marks is for viva voce

C. Dissertation

The suggested time schedule for Dissertation work is:

- Identification and selection of topic for Dissertation in third semester
- Submission of Dissertation synopsis to University before appearing for third semester university examination
- Preparation of synopsis and submission of the synopsis for ethical clearance will be submitted in third semester as per the dates notified by the ethical committee. Such synopsis will be reviewed, and the Dissertation topic will be registered by the JSS Academy of Higher Education and Research. No change in the **Dissertation** topic or guide shall be made without prior approval of the JSSAHER.
- Dissertation work should start from third semester onwards after obtaining ethical clearance.

Submission of Dissertation Report

Four copies of the Dissertation report shall be submitted to the controller of examination of the JSSAHER two months before fourth semester examination or as per the dates notified by the JSSAHER.
The Dissertation should be written under the following headings

i. Introduction
ii. Aims and objectives of study
iii. Review of Literature
iv. Material and Methods
v. Results
vi. Discussion
vii. Conclusion
viii. Summary
ix. References
x. Tables
xi. Annexure

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 with 2 years of experience and publication of minimum of 2 research papers as First author or Corresponding author in scopus/Web of scince indexed journals. The results of such work shall be submitted in the form of a Dissertation. The student can choose forensic odontology topic related to the following subjects:

1. Oral Radiology/Oral Medicine
2. Oral Pathology
3. Forensic Medicine
4. Pedodontics
5. Prosthodontics
6. Orthodontics
7. Forensic sciences
8. Forensic Odontology
9. Legal Medicine

The Dissertation is aimed to train a post graduate student in research methods and techniques. It 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.

The synopsis shall be sent through the proper channel. Such synopsis will be reviewed and the Dissertation topic will be registered by the JSSAHER. No change in the Dissertation topic or guide shall be made without prior approval of the JSSAHER.

The candidates shall report the progress of the Dissertation work to the concerned guide periodically and obtain clearance for the continuation of the Dissertation work.

A co-guide may be included provided the work requires substantial contribution. Co- guide may be from JSS AHER institutions or an external faculty with 2 years of post-graduate teaching and publication of at least 2 research papers in well indexed journals.

D. Maintenance of Logbook

A diary showing each day's work must be maintained by the candidate, which shall be scrutinized by the Head of the department every month. A list of the seminars and journal reviews that have been attended and presented by the student has to be maintained which should be scrutinized by the Head of the Department.

E. Seminars, Journal clubs and Project work:

Each candidate must present two seminars or jornal club and one project work in each semester from I to III Semester. Checklists of seminar/ journal club presentations should be maintained by each student till the completion of the course.

4. Appointment of examiners:

There shall be two examiners for theory and practical examination. Out of them one shall be external examiner and one shall be internal examiner. Postgraduate teacher with MDS/MD/ MSc /PhD degree with 2 years of experience shall be appointed as examiners.

Two Internal examiners shall be appointed subject matter expert of that respective subject for Semester I to III and for Semester IV one internal and one external from Forensic odontology, Forensic medicine and Oral pathology will be appointed. Examiners shall be Postgraduate teacher with MDS/MD/ MSc /PhD degree with 2 years of experience shall be appointed as examiners.

5. Criteria for declaring as pass in JSSAHER **Examination:**

Candidate should secure minimum 50% marks in each subject.
Theory and Practical shall be considered as separate course. If a candidate passes in practical examination but fails in theory paper, such candidate is exempted from reappearing for practical but shall have to appear for theory paper in which subject paper candidate in has failed the subsequent examinations or vice versa.
Those candidates who failed in one or more subjects shall have to appear only in the subject so failed, in the subsequent examinations

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 subsequent examination upon payment of examination fee to the JSSAHER.

Grading of performances

Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course.

Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any subject(s) in the end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the same in due course.

The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). s. It is the ratio of total credit points secured by a student in various courses in a semester and the total course credits of that semester. It shall be expressed up to two decimal places. The credit point (CP) of a course is equal to Credits (C) x Grade Point (G). Total Credit Point of a semester is sum of credit points (CP) of all courses of that semester.

Thus, the SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses in a semester and the sum of the number of credits of all the courses in that semester, i.e

$$SGPA = \sum(Ci \times Gi) \; / \; \sum Ci$$

Where Ci is the number of credits of the course and Gi is the grade point scored by the student in the course.

For example, if a student takes five courses (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$\mathbf{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA shall be expressed up to two decimal places. The SGPA for each semester shall be calculated and awarded only for those students who have passed all the courses of that semester.

Cumulative Grade Point Average (CGPA)

It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places. CGPA shall be awarded only on successful completion of the programme (all eight semesters) and it is given in final semester grade report card/final transcript.

CGPA shall be calculated as follows:

$$\mathbf{CGPA} = \frac{\mathbf{CP_1 + CP_2 + CP_3 + CP_4 + CP_5 + CP_6}}{\mathbf{C_1 + C_2 + C_3 + C_4 + C_5 + C_6}}$$

Where CP_1, CP_2, CP_3,.... is the total credit points for semester I,II,III,.... and C_1, C_2, C_3,.... is the total number of credits for semester I,II,III,....

6. 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%.**

Class shall be awarded only on successful completion of the programme (all four semesters) and it is given in final semester grade report card/final transcript. The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction = CGPA of. 8.00 And above
First Class = CGPA of 7.00 to 7.99
Second Class = CGPA of 6.00 to 6.99

The candidates who secure a CGPA of 8.00 or above and have passed in all the subjects in all the semesters in first attempt shall be declared to have obtained First Class with Distinction.

7. Carry over system:

A candidate shall be allowed to academically progress (shall be promoted from first semester to third semester regardless of examination and results). However, the candidate should have passed JSSAHER Examinations of all papers from first to third semester to enter fourth semester.

8. Award of Degree:

A candidate who has passed all the subjects of I semester to IV Semester shall be eligible for award of Degree

9. Maximum Duration for completion of the course of study

The maximum 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 candidate shall re-register for the course.

10. 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 re-totaling by paying prescribed fee.

BRIDGE COURSE

CORE 1

ANATOMY

LEARNING OUTCOMES:

C1: Comprehend the particular languages of gross anatomy and neuroanatomy

C2: Identify anatomical structures of the head and neck

C3: Correlate gross and neuroanatomical structures of the head and neck to their function and physiology in relation to various aspects of dental practice

THEORY **15 HRS**

UNIT:1 INTRODUCTION TO **2HRS**

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

UNIT : 2 HEAD & NECK **6 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

UNIT: 3 OSTEOLOGY **4 HRS**

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

UNIT: 4 EMBRYOLOGY **1 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

UNIT 5 HISTOLOGY: 2 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

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 G.A.G. Decker. Lee. Mc Gregor's Synopsis of Surgical Anatomy, 12th Edition

CORE 2
PHYSIOLOGY

LEARNING OUTCOMES:

C1: Describe the structure of major human organs and explain their role in the maintenance of healthy individuals

C2: Explain the interplay between different organ systems and how organs and cells interact to maintain biological equilibria in the face of a variable and changing environment

THEORY **15 HRS**

UNIT:1 GENERAL PHYSIOLOGY **4 hrs**

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

UNIT: 2 BLOOD **5 hrs**

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

UNIT:3 MUSCLE AND NERVE **2 hrs**

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.

UNIT: 4 DIGESTIVE SYSTEM 2 hrs

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.

UNIT:5 SPECIAL SENSES 2 hrs

1. Vision Physiological anatomy of eye ball, functions of iris, aqueous humor, Lens, rods & cones. Accommodation to near vision, Refractive errors: Myo pia, hypermetropia, presbyopia & astigmatism. Visual acuity, Visual pathways, colour vision Hearing Anatomic consideration, functions of outer, middle & inner ear, cochlea, organ of corti, mechanism of hearing. Auditory pathways, deafness types & tests
2. Gustation Taste buds, primary taste sensation, pathway for taste sensation, Olfaction Receptors, olfactory pathways.

RECOMMENDED BOOKS:

1. Vander. Human physiology: The mechanism of body function, 10th Edition 2001
2. A.K. . 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

CORE 3
BIOCHEMISTRY

LEARNING OUTCOMES

C1: Describe the synthesis of proteins, lipids, nucleic acids, and carbohydrates and their role in metabolic pathways along with their regulation at the epigenetic, transcriptional, translational, and post-translational levels including RNA and protein folding, modification, and degradation.

UNIT:1 CHEMISTRY OF BIOORGANIC MOLECULES 7 hrs

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 enzymesProenzymes, multienzyme complex and metalloenzymes
i. RIA and ELISA

UNIT:2 Vitamins 4 hrs

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

UNIT:3 Genetics and Molecular biology **4 hrs**

a. DNA replication

b. Transcription, post transcriptional modifications, reverse transcriptase22

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

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

SEMESTER I

CORE 1 SECTION A

DENTAL JURISPRUDENCE

LEARNING OUTCOMES

C1: Understanding of the many laws at the national, state, and local levels that control the practice of dentistry and the dentist

C2: Awareness of legal liabilities in dentistry and its practice

C3: Understanding the linkages between the field of law and dentistry in order to assist in taking informed, legally sound decisions and developing more ethical health care policies.

C4: Apply the duties and conduct of dental expert witness in court through moot courts

THEORY **30 HRS**

UNIT:1 INTRODUCTION TO LAW AND LEGAL SYSTEMS **10HRS**

An Overview of Indian Judicial System – Adversarial System, Sources of Law, Constitution of India, Civil and Criminal Law, Medical Negligence and Consumer Protection, evidence and Drugs and Cosmetics.

UNIT:2 DENTAL ETHICS, ETIQUETTE AND CODE OF CONDUCT 6HRS

Ethics, ethics in professions, Personal ethics, Code of Professional conduct and misconduct, Duties and Conduct of Dental expert as witnesses in court, Disciplinary action and Grounds for Suspension and revocation

UNIT:3 LEGAL ASPECTS OF DENTAL PRACTICE **8HRS**

Dental Malpractice, Negligence, Liability to Dentist, Maintenance of records, Risk preventive practices, Professional secrecy and privileged communication

UNIT:4 THE DENTIST AND THE PATIENT - A LEGAL RELATIONSHIP 6HRS

Confidentiality, Informed Consent, Breach of Contract, Dentist's Responsibilities to the Patient, Patient's Responsibilities to the Dentist

PRACTICAL **15 HRS**

Court procedure- Civil and Criminal Trial, Medico legal cases, Report writing, An exposure to Court Procedure may be held through Moot Courts. Court visit

CORE 1 SECTION B
FORENSIC SCIENCE THEORY

LEARNING OUTCOMES: After studying this paper the students will know –
C1: The significance of forensic science to human society.
C2: The fundamental principles and functions of forensic science.
C3: The divisions in a forensic science laboratory.
C4: The working of the forensic establishments in India and abroad

THEORY **30 HRS**

UNIT-I INTRODUCTION TO FORENSIC SCIENCE **10 HRS**
Definitions, Concepts, Scope, Need and Basic principles of Forensic Science.

Frye Criterion, Daubert standards and Indian enactments for evidence.

Forensic science in international perspectives, including set up of INTERPOL and FBI.

UNIT-II FORENSIC SCIENCE ESTABLISHMENTS **10 HRS**
Hierarchical set up and location of Central Forensic Science Laboratories,

Central Detective Training Institutes, State Forensic Science Laboratories.

Duties of forensic scientists; Basic and optional services.

UNIT-III CRIME SCENE MANAGEMENT **10 HRS**
Crime Scene; Meaning, types, Methods of Search. Recording and documentation of crime scene; Sketching, Photography and Crime Scene Logs.

Suggested Readings

1. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).
2. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, Delhi (2002).
3. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
4. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).
5. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
6. Annamma John, 'Advanced Technology in Forensic Investigation-A handbook with case studies' (2019)

PRACTICAL **15 HRS**

1. **Practical-1**

Title: Examination of a Simulated Scene of Crime
Learning outcomes: To know the procedure of examination of examination of a crime scene, by visiting a simulated scene of crime.

2. **Practical-2**

Title: Documentation of a simulated scene of crime
Learning Outcome:
To learn the methods of record the scene of crime, by the preparation of sketches.

Drawing of the crime scene becomes an important component of the court room presentation and Recording Notes, which is a narrative as seen by the first responder is also

3. **Practical-3**

Title: Crime Scene Photography.
Learning Outcome:
To learn the methods of recording and documenting of a crime scene, by means of photography.
To learn the various techniques of photographing of a crime scene and recording of the evidence materials.

CORE 2

DENTAL ANATOMY AND ORL EMBRYOLOGY

THEORY **60 HRS**

LEARNING OUTCOMES:

C1: Identify each group of teeth in the maxilla and mandible, to distinguish a tooth from right and left side, to distinguish a tooth from primary dentition by general morphological characteristics of permanent teeth; to name anatomical variations of teeth structure

C2 : Explain the basic developmental progression of the oral tissues

C3: Build a foundational knowledge base in the normal development, histology and structure of the teeth and associated structures.

C4: Discuss the relationship between the structure of the oral tissues and their function

C5: Processing of hard and soft tissues for microscopic study

UNIT:1 INTRODUCTION TO TOOTH MORPHOLOGY 6 HRS

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

UNIT:2 MORPHOLOGY OF PERMANENT TEETH 10 HRS

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

UNIT:3 MORPHOLOGY OF DECIDUOUS TEETH 6 HRS

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

UNIT:4 OCCLUSION: 2 HRS

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

UNIT:5 DETAILED MICROSCOPIC STUDY OF 8 HRS

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

UNIT:6 DETAILED MICROSCOPIC STUDY OF 3 HRS

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

UNIT:7 DETAILED MICROSCOPIC STUDY OF ORAL MUCOSA: 2 HRS

Variation in structure in relation to functional requirements, mechanisms of keratinization, clinical parts of gingiva, Dentogingival & Mucocutaneous junctions & lingual papil- lae. Age changes & clinical considerations.

UNIT: 8 SALIVARY GLANDS: 1 HR

Detailed microscopic study of acini & ductal system. Age changes& clinical considerations. Composition and functions of saliva

UNIT: 9 TM JOINT: 1 HR

Review of basic anatomical aspects & microscopic study & clinical considerations

UNIT:10 MAXILLARY SINUS: 1 HR

Microscopic study, anatomical variations, functions & clinical relevance of maxillary sinus in dental practice

UNIT: 11 PROCESSING OF HARD & SOFT TISSUES FOR MICROSCOPIC STUDY 2 HR

Ground sections, Decalcified sections & routine staining procedures

UNIT:12 2HR

Basic histochemical staining patterns of oral tissues:

UNIT:13 ORAL EMBRYOLOGY 10 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

Mechanisms in tooth eruption

   a. Different theories & histology of eruption
   b. Formation of dentogingival junction
   c. Role of gubernacular cord in eruption of permanent teeth
   d. Clinical or Applied aspects of disorders of eruption

4.Shedding of teeth

a. Factors & mechanisms of shedding of deciduous teeth

b. Complications of shedding

UNIT:14 ORAL PHYSIOLOGY **5 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

PRACTICALS: **45 HRS**

1.Identification of individual teeth using extracted teeth specimen, Identification of dentition using study models

2. Processing of hard and soft tissues for microscopic study

3. Ground sections, decalcified sections and routine staining procedures, Basic histochemical staining patterns of oral tissues

4. General histology of cells and tissues

5. Special stained sections

6. List of histology slides

1. DEVELOPMENT OF TOOTH:

a. Bud stage of tooth development.

b. Cap stage of tooth development

c. Early bell stage of tooth development.

d. Late Bell stage of tooth development.

e. Root formation.

2. ENAMEL

a. Hunter-Schreger Bands.

b. Tufts, Lamellae, Spindles.

c. Incremental lines of Retzius.

d. Neonatal line.
e. Gnarled Enamel.

3.DENTIN

a. Dentino – Enamel junction
b. Dentinal Tubules.
c. Incremental lines of Von Ebner
d. Contour lines of Owen
e. Tomes granular layer.
f. Interglobular Dentin.
g. Secondary Dentin.
h. Intratubular Dentin
i. Intertubular Dentin.

2. CEMENTUM

a. Cellular cementum
b. Acelular cementum
c. Cemento enamel junction
d. Hypercementosis.

3. PULP
    a. Zones of Pulp
    b. Pulp stones.

4. PERIODONTAL LIGAMENT
5. ALVEOLAR BONE

6. SALIVARY GLANDS
    a. Mucous gland.
    b. Serous gland
    c. Mixed gland.

7. MAXILLARY SINUS

8. ORAL MUCOUS MEMBRANE

a. Parakeratinised epithelium.

b. Orthokeratinised epithelium

c. Vermilion border of lip.

d. Circumvallater Papillae.

e. Fungiform Papillae

f. Filiform Papillae

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,

CORE 3 SECTION A
GENERAL PATHOLOGY

LEARNING OUTCOMES

C1: Understand and explain factors, about the causation of disease

C2 : Understand processes involved in the gross and microscopic changes of organs and tissues and explain these changes

C3: Perform laboratory procedures

C4: Identify disorders of infancy and old age changes relevant to forensic medicine

THEORY **15 HOURS**

UNIT:1 CELLULAR ADAPTATIONS AND CELL INJURY **4HRS**

atrophy, hypertrophy, aplasia, hyperplasia, necrosis, infarction, fatty change, and pathologic calcification

UNIT:2 INFLAMMATION AND REPAIR **4 HRS**

acute inflammation, chronic inflammation, healing and repair, fracture healing -

UNIT:3 HEMODYNAMIC DISTURBANCES: **2 HRS**

Thrombosis, fat embolism, shock -

UNIT:4 NEOPLASIA **3 HRS**

Definition, overview of Benign and malignant tumours, metastasis, odontogenic tumors

UNIT:5 GENETIC DISORDERS **2HRS**

Downs syndrome, Turners syndrome

Disorders of infancy and old age changes relevant to forensic medicine

PRACTICALS **15 HRS**

1. Necrosis : Coagulative necrosis, Caseating necrosis
2. Fatty change, monke bergs calcification
3. Acute inflammation – acute appendicitis, chronic inflammation- Tb Lymphnode
4. Chronic venous congestion- liver and lung
5. Benign and malignant tumor – lipoma and malignant melanoma

RECOMMENDED BOOKS:

1. Robbins & Cotran Pathologic Basis of Disease. Vinay Kumar Abul Abbas Jon Aster 9th Edition. Elsevier publishers.

CORE 3 SECTION B

GENERAL MICROBIOLOGY

LEARNING OUTCOMES

C1: Describe diversity of microorganisms, bacterial cell structure and function, microbial growth
C2: Understanding the interactions between human and microbes, diseases caused by microbes
C3: Demonstrate practical skills in fundamental staining techniques
C4: Apply infection control while handling cadavers
C5: Carry out efficient bio-medical waste management medical laboratories

THEORY: 15 HRS

UNIT:1 INTRODUCTION TO GENERAL MICROBIOLOGY 1 HR

UNIT:2 GENERAL PROPERTIES OF BACTERIA 1 HR

Morphology, classification, Physiology and growth of micro-organisms

UNIT:3 MICROBIOLOGY OF ORAL FLORA 1 HR

UNIT:4 MORPHOLOGY, CLASSIFICATION, PATHOGENICITY AND LABORATORY DIAGNOSIS OF BACTERIAL PATHOGENS OF ORAL CAVITY 4 HR

(I) Staphylococci, Streptococci

(II) Corynebacterium diphtheriae

(III) Actinomycetes & T. pallidum

(IV) M. tuberculosis

UNIT:5 GENERAL PROPERTIES OF VIRUSES 1HR

Structure and Classification

UNIT:6 STRUCTURE, CLASSIFICATION, PATHOGENESIS AND LABORATORY DIAGNOSIS OF VIRAL PATHOGENS 3 HR

(I) HIV

(II) Hepatitis viruses B & C

(III) Herpes viruses

UNIT:7 GENERAL PROPERTIES OF FUNGI - STRUCTURE AND CLASSIFICATION 1 HR

UNIT:8 ORAL CANDIDIASIS 1 HR

UNIT:9 INFECTION CONTROL PRACTICES WHILE HANDLING CADAVERS - STERILISATION & DISINFECTION 1 HR

UNIT:10 BIOMEDICAL WASTE MANAGEMENT 1 HR

PRACTICALS: 15 HRS

1. APPLIED BACTERIOLOGY -

(I)Gram stain

(II)ZN staining

(III)VDRL serological test - Case scenario

2. APPLIED VIROLOGY -

(I)Case scenario - HIV

(II)Case scenario - Hepatitis B

RECOMMENDED BOOKS:

1. Text of Microbiology- Ananthanarayan & Paniker 10th Edition, The Orient Blackswan
2. Text of Microbiology- Apurba Shankar Sastry, 2nd Edition, Jaypee Brothers, Medical Publishers Pvt. Limited
3. Text book of Microbiology- Dr.C.P.Baveja, 6th Edition, Avichal Publishing Company
4. Mackie & McCartney Practical Medical Microbiology- J.G.College et al, 14th Edition, New York : Churchill Livingstone
5. Bailey & Scott's- Diagnostic Microbiology Ellen Jo Baron et.al., 14th Edition, St. Louis, Missouri : Elsevier

CORE 4
RESEARCH METHODOLOGY

LEARNING OUTCOMES
C1: Conduct scientific research, which is reproducible by other researchers.
C2: Identify theories, hypotheses, and methods used in social science research.
C3: Choose a method and apply it to your own research in order to answer your research questions.

THEORY **30 HRS**

Unit I – Introduction to Research Methodology **(1 Hour)**
Research Methodology- Meaning of research; Types of research- Exploratory research, Conclusive research; The process of research; Research applications; Features of a Good research study.

Unit 2- Review of literature: **(2 Hours)**
Information Sources- Scientific Journals, Periodicals, Books, and other publications.

Unit 3 - Research Design: **(3 Hours)**
Meaning of Research Designs; Nature and Classification of Research Designs; Exploratory Research Designs: Secondary Resource analysis, Case study Method, Expert opinion survey, Focus group discussions; Descriptive Research Designs: Cross-sectional studies and Longitudinal studies; Experimental Designs, Errors affecting Research Design.

Unit 4- Research Problem and Formulation of Research Hypotheses: **(4 Hours)**
Research Question: Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance

Unit 5- Tools for data collection: **(3 hours)**
Collections of Primary Data, Collection of Data through questionnaire and Schedules, other Observation Interview Methods, Collection of Secondary Data, Selection of appropriate method for data collection, Techniques of developing research tools, viz. Questionnaire and rating scales etc. Reliability and validity of Research tools.

Unit 6- Qualitative and Quantitative Research: **(2 hours)**
Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication, Focus Group Discussion, Merging the two approaches.

Unit 7- Report writing: **(2 hours)**
Introduction to research report & its components, typing and formatting of research report including placement and numbering of figures and tables. Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals, Impact factor of Journals, When and where to publish, Plagiarism and Self-Plagiarism.

Unit 8: Referencing and Bibliography: (1 Hour)
Different systems of Citing References- Harvard system, Vancouver system, Chicago system, MLA and APA system, Footnote Reference system.

Unit 9- Systematic reviews and Meta analysis: (1 Hour)
Introduction, Need and Types of systematic reviews, Steps of systematic reviews, advantages of meta-analysis, Forest plot

Unit 10: Application of computer in research- MS- Office and SPSS. **(1 Hour)**

Unit 11: Bio-ethics

1. Theory, Principles, Rules, and Moral Decisions	1 Hr
2. The principles of biomedical ethics	1 Hr
3. Recognize the requirements for autonomous choice	1 Hr
4. Define competency and decisional capacity	1 Hr
5. Recognize and distinguish the various types of controlling influences that Undermine voluntariness	1 Hr
6. Recognize and distinguish no maleficence and beneficence	2 Hrs
7. Paternalism and its importance	1 Hr
8. Formal principle of justice	1 Hr
9. The Utilitarian, egalitarian, and libertarian views of justice.	1 Hr

RECOMMENDED BOOKS:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
3. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p
4. C.R. Kothari; “Research Methodology: Methods and Techniques”, 2004.
5. Ranjit Kumar; “Research Methodology: A Step-by-Step Guide for Beginners”, 4th Edition, SAGE publications, 2014.
6. D K Bhattacharyya; “Research Methodology”, 2nd Edition, Excel Books, 2006
7. An Introduction to Bioethics: Revised, Updated Edition. Thomas A. Shannon Nicholas J. Kockler. Paulist Press, 2009, 4 th Edition.
8. Bioethics. Kálmán Nyéki Gyula G. Pázmány Péter Katolikus Egyetem, 2011
9. Principles of Biomedical Ethics. Kenneth V Iserson. Jones and Bartlett Publishers 2017
10. Encyclopaedia of Bioethics. Dartmouth Medal. Stephen Garrard Post

SEMESTER II

CORE 1 SECTION A

DENTAL MATERIALS

LEARNIG OUTCOMES:

C1: Understanding the importance, composition and physical properties of dental materials

C2: . Identification of dental appliances and dental restorations

C3: Demonstrate alginate impression making on patients

C4: Apply denture marking procedures on fixed and removable partial dentures

THEORY **30 hrs**

UNIT 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

UNIT : 2 BIOLOGICAL CONSIDERATIONS IN USE OF DENTAL MATERIAL **3 hrs**

Classification of materials from perspective of biological compatibility, e.g., 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.

UNIT:3 GYPSUM & GYPSUM PRODUCTS **4 hrs**

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

Dental plaster, Dental stone, Die stone, high strength, high expansion stone.

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

ADA classification of gypsum products Disinfection : infection control, liquids, sprays, radiation Storage of material – shelf life

UNIT:4 IMPRESSION MATERIALS USED IN DENTISTRY 4 hrs

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

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

Type of impression trays required, Adhesion to tray, manipulation, instruments & equipment required

UNIT:5 DENTAL WAXES 2 hrs

1. 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.
2. Other waxes: Applications, mode of supply & properties.
3. Impression wax, Bite registration wax.

UNIT 6 YNTHETIC RESINS USED IN DENTISTRY- 2 hrs

Classification of resins

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.

Acrylic Resins,Restorative Resins:

UNIT:7 METAL AND ALLOYS 4 hrs

Structure and behavior of metals, Solidification of metals, mechanism of crystallization 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.

Dental Amalgam

Direct filling gold

Dental casting alloys

UNIT: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

UNIT:9 DENTAL CERAMICS **3 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.

UNIT:10 DENTAL IMPLANTS **2 hr**

Evolution of dental implants, types and materials

PRACTICALS- **15hrs**

1. Manipulation of

   a. Plaster of Paris
   b. Dental Stone
   c. Alginate
   d. Elastomeric Impression Materials
   e. Dental Cements

2. Alginate impression making on patient
3. Identification of dental appliances (cd, rpd, fpd, pedodontic appliances, orthodontic appliances) and dental restorations
4. Denture Marking

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 appli- cations, 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

CORE I SECTION B
ORAL PATHOLOGY

Learning Outcomes :

C1 : Understanding of oral pathology in dealing with the nature of oral diseases, their causes, processes and effects

C2 : Differentiate between normal and anomalous oral and para oral structures

C3 : Demonstrate ground sectioning dental hard tissues

C4 : Identify regressive alterations of teeth, physical, chemical, biological injuries of the oral cavity

THEORY **30 hrs**

UNIT:1 DEVELOPMENTAL DISTURBANCES **10 HRS**

Developmental disturbances of oral and para-oral structures jaws and soft tissues of oral & para oral 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.

UNIT:2 PHYSICAL, CHEMICAL AND BIOLOGICAL INJURIES OF THE ORAL CAVITY **4 HRS**

UNIT:3 REGRESSIVE ALTERATIONS OF TEETH **4 HRS**

UNIT:4 RADIATION EFFECTS ON ORAL CAVITY **2 HRS**

UNIT:5 HEALING OF ORAL WOUNDS & COMPLICATIONS **4 HRS**

UNIT:6 SYSTEMIC DISEASES INVOLVING ORAL CAVITY **6 HRS**

Oral manifesttions of systemic diseases

Practicals: **15hrs**

1. Identification of Hard and Soft Tissue specimens
2. Demonstration of cytosmear and bacteriology smear
3. Identification of Microscopic slides
4. Ground sectioning of dental hard tissues

RECOMMENDED BOOKS:

1. Text book of Oral Pathology, Shafer, Hine and Levy, 4th,5th,6th Ed
2. Text book of Oral Pathology, Neville, Allan, Bouquot, 3rd, 4th Ed, Elsevier
3. Text book of Oral Pathology, Regezzi, Schuibba, 5th and 6th Ed, Elsevier

CORE 2
ORAL RADIOLOGY

LEARNING OUTCOMES

C1: Explain the physics of dental radiology, biologic effects of radiation, radiation protection measures, principles of intra-oral and extraoral radiography, imaging procedures and techniques, indications and limitations of dental radiography

C2 : Identify the normal conditions and pathologies on a dental radiograph

C3 : Demonstrate a methodological approach and apply principles of radiographic interpretation

C4 : Operate imaging equipment, accessory devices and film processing equipments to produce quality intra-oral radiographs while incorporating appropriate radiation protection protocols.

C5 : Apply portable radiography in postmortem

THEORY **60 Hrs**

UNIT-1 **10 hrs**

-Introduction, Scope and history

-Physics of radiation:

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

UNIT-2 **10 hrs**

Biological effects of radiation

Radiation safety and protection measures

UNIT-3 **20 hrs**

Principles of image production

Radiographic techniques:

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. Advanced imaging techniques

UNIT-4 **10 hrs**

Radiographic normal anatomical landmarks

Faulty radiographs and artifacts in radiographs

UNIT-5 **6 hrs**

Radiographic differential diagnosis of maxillofacial pathologies

UNIT – 6 **4 HRS**

Portable radiography

PRACTICALS **30 HRS**

a. Intra-oral radiographs - Periapical, bitewing, Occlusal

b. Panoramic radiography

c. Skull radiography

d. Post mortem dental radiography

e. Interpretation of dental radiographs

RECOMMENDED BOOKS:

1. Textbook of Oral Medicine and Basic Oral Radiology. Anil Govindrao Ghom, .2014 3 rd Edition. Jaypee publications.
2. Oral Radiology.Principles and Interpretation. Stuart C. White, Michael J. Pharoah .2008. 6 th Edition.Mosby publications.
3. Essentials of Oral and Maxillofacial Radiology Freny R. Karjodkar 2014. Jaypee publications.
4. Essentials of Dental Radiography and Radiology.5th Edition. Eric Whaites Nicholas Drage. Elsevier publications.

CORE 3
FORENSIC ANTHROPOLOGY

Course Outcomes:

C1: Importance of forensic anthropology in identification of persons.

C2: Identification of human bones

C3: Determination of Age Sex and Stature

C4: Significance of somatoscopy and somatometry.

C5: Different techniques of facial reconstruction and their forensic importance.

C6: Identification by genetic traits, anomalies and etiology.

Theory **45 HRS**

Unit 1: Significance of Forensic Anthropology **9 HRS**

Scope of forensic anthropology. Study of human skeleton. Nature, formation, and
identification of human bones.

Unit 2 :Determination of age, sex, stature from skeletal material 9 HRS

Unit 3: Personal Identification – Somatoscopy **9 HRS**

Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiog- nomic ear breadth, circumference of head. Scar marks and occupational marks.

Unit 4: Personal Identification – Somatometry **9 HRS**

Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height.
Indices - cephalic index, nasal index, cranial index, upper facial index.

Unit 5: Facial Reconstruction **9 HRS**

Portrait Parle/ Bertillon system. Photofit/identi kit. Facial superimposition tech- niques.
Cranio facial super imposition techniques – photographic super imposition, video- superimposition, Roentgenographic superimposition. Use of somatoscopic and craniometric methods in reconstruction. Importance of tissue depth in facial re- construction.
Genetic and congenital anomalies – causes, types, identification and their forensic significance.

Practicals **30 HRS**

1. To determine of age from skull and teeth.
2. To determine of sex from skull.
3. To determine sex from pelvis.
4. To study identification and description of bones and their measurements.
5. To investigate the differences between animal and human bones.
6. To perform somatometric measurements on living subjects.
7. To carry out craniometric measurements of human skull.

8. To estimate stature from long bone length.
9. To conduct portrait parley using photofit identification kit.

Suggested Readings

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Introduction to Forensic Sciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
2. D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).
3. S.Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press, Mexico (1998).

CORE 4

BIOSTATISTICS

LEARNING OUTCOMES

C1: Recognize the importance of data collection and its role in determining scope of inference.
C2: Demonstrate an understanding of interval estimation and hypothesis testing.
C3 : Choose and apply appropriate statistical methods for analyzing one or two variables.
C4 : Use technology to perform descriptive and inferential data analysis for one or two variables.
C5 : Interpret statistical results correctly, effectively, and in context.
C6 : Understand and critique data-based claims.
C7:Appreciate the power of data.
C8 :Apply the basic terminology and definitions of epidemiology.

THEORY **30 Hours**

Unit – I : **4 Hours**
Introduction :Introduction to Biostatistics; levels of measurement – nominal, ordinal, interval and ratio scales; Types of Data- quantitative and qualitative, Descriptive statistics – Central tendency, dispersion, skewness and kurtosis.

Unit – II: **4 Hours**
Sampling : Probability and non-probability; simple random, stratified, systematic, cluster and multistage sampling; sampling and non – sampling errors, Sample size estimation : Sample size determination for estimation : sample size determination for estimation of mean, estimation of proportion, comparing two means and comparing two proportions.

Unit – III : **8 Hours**
Hypothesis testing : formulation and types; null hypothesis, alternate hypothesis, type I and type II errors, level of significance, power of the test, p –value , concept of standard error and confidence interval . Concept of Probability "probability distribution – normal, poisson, binomial, Simple linear correlation and regression

Unit – IV: **2 Hours**
Correlation- Types of correlation, Scatter plot, Correlation coefficients- Pearson's and spearman's rank order correlation coefficients.

Unit – V : **4 Hours**
Tests of significance – Parametric tests: requirements, "t" test, normal z – test , and "F' test including post – hoc tests, one – way and two-way analysis of variance, analysis of covariance, repeated measures analysis of variance

Unit – VI: **3 Hours**

Test of significance – Non – parametric tests: Assumptions; one – sample tests (sign test, McNemar test); two – sample test (Mann whitney U test, Wilcoxon rank sum test); k –sample tests (Kruskal wallies test, and Friedman test) and chi-square test.

Unit – VII : **5 Hours**

Multivariate analysis : Introduction, Multiple regression, logistic regression, factor analysis, cluster analysis,

Unit- VIII: **2 Hour**

Survival analysis: Definition, Types of censoring, Survival function, hazard function

Essential References:

1. Daniel, W.W. (2005). Biostatistics: a foundation for analysis in health sciences (8^{th} ed.) New York: John wiley and Sons.
2. Dillon, W.R. & Goldstein, M. (1984). Multivariate analysis: Methods & Applications. New York: John Wiley & Sons.
3. Hassart, T.H (1991). Understanding Biostatistics. ST. Louis: Mosby year Book.
4. Kothari, C.R.(2003) Research Methodology. New Delhi: Wishwa Prakshna.
5. Siegal, S. & castellan, N.J (1988). Non – parametric statistics for the behavioral sciences. McGraw Hill: New Delhi

SEMESTER III

CORE 1

FORENSIC ODONTOLOGY

LEARNING OBJECTIVES

C1: Determine the age, sex and stature of both the living and deceased.
C2: Collect, preserve and analyze odontological evidences retrieved from the crime scene
C3: Identify unknown human remains (DVI) through dental records and craniofacial bones.
C4: Elicit the ethnicity and assisting in building up picture of lifestyle and diet of skeletal remains
C4: Understand the concepts and methodology involved in the examination, analysis, and , the comparison of human bite marks, lip prints and rugae pattern
C5: Report writing and presentation in court of law

THEORY **60 Hrs**

UNIT :1 Introduction **2 Hrs**

a. Recent developments and future trends
b. History of Forensic Dentistry
c. Scope of Forensic Odontology

UNIT : 2 Maintaining dental records **2 Hrs**

a. Basic aspects of good record keeping
b. Different types of dental records
c. Digital record keeping

UNIT :3 COMPARATIVE DENTAL ANATOMY **4 HRS**

UNIT :4 Age estimation in adults **8 HRS**

Radiographic, clinical, morphological and histological methods

UNIT :5 Sex determination **6 HRS**

Sex determination of adults from denta and skeletal morphology

Sex determination from radiographs

UNIT :6 Dental and Maxillofacial trauma **4 Hrs**

UNIT :7 Dental identification: **4 Hrs**

Definition, Basis for dental identification, Postmortem procedures, Dental record compilation and interpretation, Comparison of data and principles of report writing, Postmortem changes of oral structures

UNIT : 8 Computers in Forensics **2 HRS**

UNIT : 9 Racial differences in tooth morphology **6 HRS**

Description of human population groups, Genetic and environmental influences on tooth morphology, Description of metric and non-metric dental features used in race differentiation

UNIT10 : Dentist's role in mass disasters **4 HRS**

Disaster Victim Identification

UNIT : 11 Bite mark procedures **4 HRS**

d. Definition and classification
e. Basis for bite mark investigation
f. Bite mark appearance
g. Macroscopic and microscopic ageing of bite marks
h. Evidence collection from the victim and suspect of bite mark
i. Analysis and comparison
j. Principles of report writing
k. Animal bite investigation

UNIT :12 CHEILOSCOPY **2 HRS**

UNIT :13 RUGOSCOPY **2 HRS**

UNIT :14 DNA EXTRACTION FROM ORAL STRUCTURES **2 HRS**

UNIT :15 FORENSIC FACIAL RECONSTRUCTION **2 HRS**

UNIT : 16 DENTAL AUTOPSY **2 HRS**

UNIT :17 3D TECHNOLOGY IN FORENSICS **2 HRS**

UNIT : 18 International Organisation for Forensic Odontolostomatology (IOFOS) and American Board of Forensic Odontology (ABFO) quality assurance guidelines in evidence collection, preservation, analysis and report writing. **2 HRS**

PRACTICALS **30 Hrs**

I. Dental charting
II. Oral autopsies and dental identification process
III. Bitemarks, recording, analysis and interpretation

IV. Cheiloscopy

V. Rugoscopy

VI. Forensic Facial reconstruction

VII. Age estimation in children & adults

- Radiographic method
- Clinical method
- Histologic method

VIII. Sex determination in adults from Morphometric, Radiographic. Dental and Skeletal morphology.

IX .International Organization for Forensic Odonto -stomatology (IOFOS) and American Board of Forensic Odontology (ABFO) quality assurance guide- lines in evidence collection, preservation, analysis and report writing.

X. Report writing and presentation in court of law

RECOMMENDED BOOKS:

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

RECOMMENDED JOURNALS:

1 Forensic Science International
2 Journal of Forensic Sciences
3 American Journal of Forensic Medicine and Pathology
4 Forensic Science International
5 Journal of Forensic Psychiatry and Psychology

6 Environmental Forensics
7 Journal of Forensic and Legal Medicine
8 Science and Justice - Journal of the Forensic Science Society
9 Forensic Toxicology
10 Forensic Science, Medicine, and Pathology
11 Journal of Forensic Identification
12 Journal of Forensic Odonto-Stomatology
13 Journal of Forensic Medicine and Toxicology
14 Journal of the Canadian Society of Forensic Science
15 Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology
16 Australian Journal of Forensic Sciences
17 Journal of Forensic Practice
18 International Journal of Digital Crime and Forensics
19 Indian Journal of Forensic Medicine and Toxicology
20 International Journal of Forensic Mental Health
21 Journal of Digital Forensic Practice
22 Journal of Forensic Radiology and Imaging
23 Journal of Indian Academy of Forensic Medicine
24 Chinese Journal of Forensic Medicine
25 Forensic Science International Supplement Series
26 Forensic Science Review
27 Journal of Punjab Academy of Forensic Medicine and Toxicology
28 International journal of forensic science & pathology
29 Journal of forensic dental sciences
30 The open forensic science journal
31 Journal of clinical forensic medicine
32 The International journal of forensic dentistry

CORE 2

PEDIATRIC DENTISTRY IN FORENSIC ODONTOLOGY

COURSE OUTCOMES

C1 : apply an advanced body of theoretical knowledge and cognitive skills to enhance practice in paediatric Dental aspects of forensic odontology

C2 : appropriately interpret and incorporate medico-legal principles to the practice of paediatric dental forensics

C3 : demonstrate analytical skills in the application of age estimation and sex determination of children and adolescents

C4 : Chairside assessment of child abuse and reporting

Theory **60 HRS**

UNIT 1 : AGE ESTIMATION IN CHILDREN **20 HRS**

- Based on the height and weight of the children
- Based on the tooth emergence
- Based on tooth calcification – Demirijan's method, Nolla's method

UNIT 2 : SEX DETERMINATION IN CHILDREN **8 HRS**

- Based on dental and craniofacial structures

UNIT 3 : CHILD ABUSE AND FORENSIC DENTIST'S ROLE **8 HRS**

- Definition of child abuse
- Types of Abuse
- Reporting of the child abuse
- Legal issues with reporting child abuse

UNIT 4 : FORENSIC PHOTOGRAPHY **4 HRS**

UNIT 5 : POST NATAL GROWTH AND DEVELOPMENT **20 HRS**

- Post Natal Growth and Development of cranium
- Theories of growth and development
- Post natal growth and development of maxilla and mandible including age changes
- Development of dentition
- Development of occlusion
- Factors influencing growth

Practical **30 HRS**

- Identification of deciduous teeth, comparative dental anatomy of deciduous and permanent teeth – 6 hrs
- Age estimation based on eruption of teeth– 3 hrs
- Demirijan's method of age estimation – 6 hrs
- Nolla's method - 6 hrs
- Sex determination in children in dental and craniofacial structures – 6 hrs
- Chronology of eruption of teeth – 3hrs

RECOMMENDED BOOKS:

1. David R Senn, Richard A Weems. Manual of Forensic Odontology. 5th Edition, CRC Press Taylor and Francis Group
2. Catherine Adams, Romina Carabott, Sam Evans. Forensic Odontology – An Essential Guide. 1st Edition, Wiley Balckwell Publisher
3. Nitul Jain. Text book of Forensic Odontology. 1st Edition, Jaypee Publisher
4. Shobha Tandon. Text of Paediatric Dentistry. 3rd Edition, Paras Medical Publisher
5. Donald H. Enlow, Robert E. Moyers. Handbook of facial growth 2nd Edition, Saunders Publisher
6. Thomas David Jim Lewis. Forensic Odontology. Principles and practice. 1st Edition, Wiley Publisher
7. Robert Moyers. Handbook of Orthodontics. 4th Edition, Elsevier Publisher
8. MS Muthu, N Sivakumar. Pediatric Dentistry. Principles and Practice. 2nd Edition, Elsevier Publisher
9. PR Chockalingham. Illustrated Pediatric Dentistry. 1st Edition, Wolters Kluwer.

CORE 3

FORENSIC MEDICINE AND TOXICOLOGY

Course Outcomes

C1: Learn various methods of forensic identification

C2: Assessmet of human behavior and mental illness in civil and Criminal responsibilities

C3: Assessment of the postmortem changes

C4: Examine the importance of the types of wounds and injuries

C5: Importance of investigation of Sexual Assault cases

C6: Familiarization with the medico legal procedures in the court of law

THEORY **60 HRS**

UNIT 1: IDENTIFICATION: **10 HRS**

a. Identification: Definition and types, Characteristics of Identification. Determination of race, religion, gender, disorders of sexual development. Determination of age. Role of scars, tattoo, occupational marks in identification. Anthropometry. Finger prints, foot prints etc. and their medico legal aspects.

b. Forensic Anthropology: skeletal remains examination of skull & mandible.

UNIT 2 :FORENSIC PSYCHIATRY: **8 HRS**

a. Physical illness and mental illness , definition of Forensic Psychiatry , common mental disorders and abnormal human behaviours, medico legal aspects of insanity and abnormal human behaviour, mental illness and responsibility, civil and criminal responsibilities of mentally ill , true insanity and Feigned insanity, mental retardation and its types, psychiatric assessment and certification, mental Health Care Act 2017.

UNIT 3 :FORENSIC TRAUMATOLOGY: **16 HRS**

a. Mechanical injuries & their medico legal aspects in relation to nature of injuries, accidental, suicidal, homicidal. Distinction between injuries caused during life and death. Medico legal examination of injured person.

b.Regional and Transportation injuries. Injuries from thermal, electricity, lightning and radiation.

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

d.Mass disasters, Bombs and other explosives. Biological and chemical warfare agents.

UNIT 4 :FORENSIC TOXICOLOGY: **7 HRS**

a. Definition of General & forensic toxicology.
b. Laws about poisons.
c. Classification of poisons.
d. Factors modifying the action of poisons.
e. Diagnosis and treatment of poisoning.
f. Duties of a doctor in suspected case of poisoning.
g. Oral manifestations of poisons.

UNIT 5 :POSTMORTEM CHANGES **7 HRS**

Immediate changes after death. Early changes after death: Changes in the skin and eye, Post-mortem Staining, Rigor mortis, Algor mortis. Late changes after death: decomposition, adipocere, mummification.

UNIT 6: LEGAL PROCEDURE **12 HRS**

Definition of medical jurisprudence. 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.Relevant parts of indian penal code of criminal procedure, indian evidence act . Supreme court and high court landmark judgments related to forensic medicine and medical jurisprudence

PRACTICAL **30 HRS**

a. Medico-legal autopsy including fetal autopsy (Demonstration)
b. Oral Autopsy (demonstration)
c. Age estimation and Medico-legal examination of X-rays
d. Medico-legal injury report preparation
e. Medico-legal examination of bones, weapons, photographs, clothing, wet specimens, poisons
f. Court evidence / attendance
g. Expert opinion on clinical cases of medico legal importance

RECOMMENDED BOOKS:

1. Modi's Text book of medical Jurisprudence & Toxicology.
2. The essentials of forensic medicine & toxicology. K.S.N. Reddy.
3. The textbook of Forensic Medicine. J.B. Mukharjee, Vol. 1 & 2.
4. Principles of Forensic Medicine. A. Nandy.
5. A Textbook of Forensic Medicine & Toxicology, Principles & Practice. Krishan Vij
6. Textbook of Forensic Medicine & Toxicology V.V. Pillay.
7. Modern Medical Toxicology. V.V. Pillay
8. Forensic Pathology. Bernard Knight
9. Handbook of Forensic Pathology. Vincent J.M. Di Maio & Suzzanna E. Dana.

RECOMMENDED JOURNALS:

1. Journal of Karnataka Medico-Legal Society
2. Journal of South India Medico-Legal Association
3. Journal of Indian Academy of Forensic Medicine
4. Journal of Forensic Sciences.
5. Journal of Legal Medicine (Of American College Medicine.).

6. Journal of Forensic Science Society.
7. Medico-legal update.
8. American Journal of Law & Medicine.
9. American Journal of Forensic Medicine.
10. Forensic Science International.
11. Journal of Clinical Forensic Medicine.
12. Medicine Science & Law.
13. Science & Justice.
14. Journal of Punjab Academy of Forensic Medicine and Toxicology
15. Journal of Forensic Medicine & Toxicology, (Medico-legal Society.)
16. Medico-legal Update, An International Journal.
17. Journal of Clinical Forensic Medicine.
18. Journal of Forensic and Legal Medicine
19. International Journal of Legal Medicine
20. Forensic Science international
21. American Journal of Forensic Medicine and Pathology
22. Indian Journal of Forensic sciences

ELECTIVE I

DNA typing **15 HRS**

LEARNING OUTCOMES

C1: The forensic significance of DNA typing.

C2: The importance of short tandem repeats and restriction fragment length polymorphism in DNA technique.

C3: Role of DNA typing in parentage testing.

Unit 1: Basic Principles

DNA as biological blueprint of life. Extraction of DNA for analysis. Quantitation of DNA – yield gel quantitation and slot blot quantitation. Mitochondrial DNA – se- quence analysis.

Unit 2: Forensic DNA Typing

Collection of specimens. Polymerase chain reaction – historical perspective, sequence polymorphisms, individualization of evidence.
Short tandem repeats (STR) – role of fluorescent dyes, nature of STR loci.
Restriction fragment length polymorphism (RFLP) – genetic markers used in RFLP,typing procedure and interpretation of results.
Touch DNA.

Unit 3: Parentage Testing

Principles of heredity. Genetics of paternity. DNA testing in disputed paternity. Mandelian laws of parentage testing. Mathematical basis of parentage identifica- tion.
Missing body cases. Reference populations and databases.
Report Writing: Role of DNA typing in identifying unrecognizable bodies.

Allele frequency determination. Hardy-Weinberg law. Probability determination in
a population database.

Suggested Readings

1. J.M. Butler, Forensic DNA Typing, Elsevier, Burlington (2005).
2. K. Inman and N. Rudin, An Introduction to Forensic DNA Analysis, CRCPress, Boca Raton (1997).
3. H. Coleman and E. Swenson, DNA in the Courtroom: A Trial Watcher's Guide, GeneLex Corporation, Washington (1994).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

ELECTIVE II

HUMANITARIAN FORENSICS **15 HRS**

LEARNING OUTCOMES

C1: Principles of humanitarian forensic action and the legal framework

C2: Understanding of how forensic science can respond to humanitarian needs of populations during and after conflicts, disasters and situations of violence

C3: Strengthens the conceptual, technical and interpersonal skills required by forensic experts to effectively navigate in the humanitarian context

UNIT 1 : INTRODUCTION

Introduction, History of Humanitarian Forensic Action, principles of humanitarian action forensic humanitarian organizations and emergency services

UNIT 2 : LEGAL FRAMEWORK

Main legal frameworks, International Humanitarian law, Medico – legal and death investigation systems

UNIT 3 : DIGNIFIED MANAGEMENT OF DEAD

Management of dead in emergencies, transport, storage, disposition, repatriation, cemeteries, temporary burials, coordination and preparedness, challenges in MotD

UNIT 4 : SEARCH FOR MISSING AND DEAD

Investigation, Emergency search, Satellite imagery exercise, recovery operations- Emergency recovery, The site, Forensic Archaeology

UNIT 5 : DATA MANAGEMENT

Collection of unidentified persons data, collection of missing persons data, data management systems, comparison of data, transmissibility and sharing, Interpol guidelines

UNIT 6 : IDENTIFICATION PROCESS

Forensic anthropology, odontology and genetics applications in Humanitarian contexts, the multidisciplinary approach, scientific identification and legal identification, causes of misidentification and risk management in risk identification

SUGGESTED READINGS :

1. Management of Dead Bodies after Disasters: A Field Manual for First Responders 2nd Edition, published by International Committee of Red Cross
2. Tidball-Binz, M. Managing the dead in catastrophes: guiding principals and practical recommendations for first responders. International Review of the Red Cross. 2007, 89 (866): 421-442.
3. Principles of good DVI governance. Interpol Disaster Victim Identification. Lyon: Interpol. (http://www.
interpol.int/INTERPOL-expertise/Forensics/DVI).
4. Missing people, DNA analysis and identification of human remains: A guide to best practice in armed conflicts and other situations of armed violence. Second Edition. International Committee of the Red Cross, 2009.

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