

LESSON PLANS FOR THE ACADEMIC YEAR 2023-2024

M.Sc. FORENSIC SCIENCE Semester I (CCE Syllabus)

Class: M.Sc. Forensic Science Course/Paper:I/FS 101T (Criminal Justice System & Forensic Science)

Section: Semester I

Unit I: Introduction to Forensic Science

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Forensic Science: Introduction, Definition, History, Development and Role of Forensic |
| | Science in crime investigation |
| 2 | Principles and Branches of Forensic Science |
| 3 | Organization of Forensic Science laboratories and other allied institutions (FSL, CFSL, |
| | GEsQD, FPB, NCRB, CDTS, IB, NCB, CBI, Police academies, BPR&D, DFSS, NCFL, |
| | Clues Team, RAW) |
| 4 | Classification and probative value of physical evidence |
| 5 | Locard's exchange principle and Chain of custody |
| 6 | Daubert standard and Frye standard of admissibility of evidence |
| 7 | Definition, nature and types of crime scene; Legal considerations at the crime scene |
| 8 | Crime Scene processing (Crime scene safety, securing, searching, recording the crime scene, |
| | reconstruction of the scene of crime and investigation of crime) |
| 9 | Collection, preservation, packing and forwarding of physical evidence |
| 10 | Qualification, duties, code of conduct and professional responsibility of Forensic Scientist |
| 11 | Forensic report preparation |
| 12 | Teaching ethical values to Forensic Scientists; Ethical decision making and Ethical |
| | dilemmas |
| 13 | Court testimony: Introduction and Admissibility of expert testimony |
| 14 | Expert and lay witnesses |
| 15 | Giving testimony as an Expert |

Class: M.Sc. Forensic Science Course/Paper:I/FS 101T (Criminal Justice System & Forensic Science) Section: Semester I

Unit II: Criminology, Penology and Forensic Psychology No. of Hours Allotted: 15

Name of the Teacher: Mrs. G. Sowmya

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Definition, Scope and schools of criminology |
| 2 | Crime: Definition, concept (Mens rea and Actus rea), types (Juvenile delinquency; Crime |
| | against women; White collar and blue collar crimes; Alcohol, drugs and crime; Organized |
| | crime; serial murders), causes and factors responsible for crime |
| 3 | Definition of criminal, Criminal behaviour, theories of criminal behaviour, Criminal |
| | profiling (Objectives, pattern, methodology and paradigms of criminal profiling) |
| 4 | Victimology: Definition, Types of victims and victim protection |
| 5 | Penology: Definition, Elements, theories and types of punishment (Capital punishment) |
| 6 | Prisons and Correctional institutions (Objectives, Administration, functioning and |
| | limitations) |
| 7 | Nature, Scope and goals of Psychology, Fields of psychology (Pure and Applied) |
| 8 | Cognitive processes (Sensation, Attention, Perception), Process of learning |
| 9 | Memory (Encoding, Storage, Retrieval), Types of memory (Sensory, STM, LTM), |
| | Concepts related to memory (Explicit, Implicit, Eyewitness memory and TOT), Forgetting |
| | (Decay theory, Interference theory, Motivated forgetting) |
| 10 | Causes of Psychopathology |
| 11 | Personality disorders, Substance related disorders |
| 12 | Stress and coping strategies |
| 13 | Scope and importance of Forensic Psychology, Psychological disorders and psychiatric |
| | disorders |
| 14 | Deception detection techniques (Forensic hypnosis, Narcoanalysis, Polygraphy, Brain |
| | fingerprinting) |
| 15 | Applications of Forensic Psychology in various crimes |

Class: M.Sc. Forensic Science Course/Paper:I/FS 101T (Criminal Justice System & Forensic Science) Section: Semester I

Unit III: Law

No. of Hours Allotted: 15

Name of the Teacher: Dr. B. Vijayalaxmi

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Administration of civil justice and criminal justice |
| 2 | Hierarchy of courts |
| 3 | Types and Jurisdiction of courts (Civil and criminal) |
| 4 | Functions and duties of police |
| 5 | Cognizable and Non- cognizable offences |
| 6 | Powers of police to search, seize and arrest |
| 7 | Investigation of offences by police, Application of Forensic techniques in investigation |
| | (Narcoanalysis; Polygraphy; Brain Fingerprinting) |
| 8 | Scientific methods of investigation, Third degree methods and Human rights |
| 9 | Role and responsibilities of prosecution |
| 10 | Salient features, Fundamental rights, Directive Principles of State Policy and Fundamental |
| | duties |
| 11 | Indian Penal Code, 1860:Criminal Conspiracy (Sections 120-A, 120-B), Offences against |
| | Decency and Morals (Sections 292, 293), Offences against human body (Sections 299 to |
| | 302, 304-A, 304-B, 307 to 309, 359, 362, 375, 376), Offences against property (Sections |
| | 378, 390, 415, 420), Offences relating to Documents (Sections 463, 465) Code of Criminal |
| | Procedure, 1973:Expert Witness (Section 293), Trial of person (Section 300) and Indian |
| | Evidence Act -Opinion of Third Persons (Sections 45 to 47), Facts which need not be |
| | proved (Sections 57, 58), Oral evidence (Section 60), Electronic Evidence (Section 65-B), |
| | Documentary Evidence (Section 73) |
| 12 | Examination of Witness (Section 135 to 138, 145, 159) |
| 13 | POCSO Act, RTI Act, SC/ST (Prevention of Atrocities) Act |
| 14 | Dowry Prohibition Act, UAPA Act, Environmental Protection Act |
| 15 | Prevention of Corruption Act, The Copyright Act, Consumer Protection Act |

Class: M.Sc. Forensic Science Course/Paper:II/FS 102T (Instrumental Methods of Analysis) Section: Semester I

Unit I: Atomic and Molecular Spectrometry

No. of Hours Allotted: 15

Name of the Teacher: **Dr. Raju Jannapureddy**

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | General properties of Electromagnetic Radiation |
| 2 | Wave and quantum mechanical properties of radiation |
| 3 | Optical Atomic Spectra |
| 4 | Principle, instrumentation, techniques and forensic applications of Atomic Absorption and |
| | Atomic Emission Spectrometry |
| 5 | Principle, instrumentation, techniques and forensic applications of Atomic Fluorescence |
| | Spectrometry |
| 6 | Principle, instrumentation, techniques and forensic applications of Atomic Mass |
| | Spectrometry and Atomic X-Ray Spectrometry |
| 7 | Principle, instrumentation, qualitative and quantitative analysis of samples by UV-Visible |
| | spectrometry |
| 8 | Photometric Titrations and Photo acoustic Spectroscopy |
| 9 | Molecular Luminescence Spectrometry: Theory, instrumentation and forensic applications |
| | of Fluorescence, Phosphorescence and Chemiluminescence methods |
| 10 | Theory, instrumentation, techniques and applications of Mid IR Absorption, Mid IR |
| | Reflection and Photo acoustic IR Spectrometry |
| 11 | Near and Far IR Spectrometry, IR Micro spectrometry |
| 12 | Principle, instrumentation, techniques and applications of Raman Spectroscopy |
| 13 | Principle, instrumentation, techniques and applications of ¹ H NMR |
| 14 | Principle, instrumentation, techniques and applications of ¹³ C NMR |
| 15 | Principle, instrumentation, techniques and applications of MRI |

Class: M.Sc. Forensic Science Course/Paper:II/FS 102T (Instrumental Methods of Analysis) Section: Semester I

Unit II: Chromatographic and Hyphenated techniques No. of Hours Allotted: 15

Name of the Teacher: **Dr. Raju Jannapureddy**

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Introduction and History of Chromatography |
| 2 | Theoretical principles of Chromatography |
| 3 | Classification of Chromatographic Methods |
| 4 | Principle, instrumentation, techniques and applications of Thin Layer Chromatography |
| 5 | Principle, instrumentation, techniques and applications of HPTLC |
| 6 | Principle, instrumentation, techniques and applications of SCFC |
| 7 | Principle, technique, instrumentation and applications of Adsorption, Partition, Gas-Solid, |
| | Gas-Liquid |
| 8 | Principle, technique, instrumentation and applications of Isothermal Gas chromatography |
| | and Linear Temperature Programming |
| 9 | Chiral, Pyrolysis and Derivatization gas chromatography |
| 10 | Principle, technique, instrumentation and applications of HPLC |
| 11 | Isocratic, Gradient, Adsorption, Partition chromatography |
| 12 | Ion and Derivatization Chromatography |
| 13 | ICP-MS: Principles, Instrumentation, Technique and Applications |
| 14 | Principle, instrumentation, techniques and applications of GC-FTIR, GC-MS, LC-MS |
| 15 | Principle, instrumentation, techniques and applications of CE-MS, MS-MS |

Class: M.Sc. Forensic Science Course/Paper:II/FS 102T (Instrumental Methods of Analysis)

Section: Semester I

Unit III: Electrochemical and Other instrumental methods No

No. of Hours Allotted: 15

Name of the Teacher: Dr. Someshwar Pola

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Introduction and general principles of electrochemical techniques |
| 2 | Principles, instrumentation, techniques and applications of Potentiometry and Coulometry |
| 3 | Principles, Instrumentation, Techniques and Applications of Polarography and ion selective |
| | electrodes |
| 4 | Principles, Instrumentation, Techniques and Applications of Thermogravimetric Methods |
| 5 | Principles, Instrumentation, Techniques and Applications of Differential Thermal Analysis |
| 6 | Principles, Instrumentation, Techniques and Applications of Differential Scanning |
| | Calorimetry |
| 7 | Introduction to Radioactive Isotopes |
| 8 | Principles, Instrumentation, Techniques and Application of Neutron Activation Analysis |
| 9 | Isotope Dilution Methods |
| 10 | Introduction and theory of XRD |
| 11 | Principle and instrumentation of XRD |
| 12 | Techniques and applications of XRD |
| 13 | Introduction, history of electrophoresis, classification and factors affecting electrophoretic |
| | techniques |
| 14 | Principle, instrumentation, technique and applications of Zone electrophoresis and Capillary |
| | electrophoresis |
| 15 | Principle, instrumentation, technique and applications of Isotachophoresis and isoelectric |
| | focusing |

Class: M.Sc. Forensic Science Course/Paper:III/FS 103T (Forensic Biology & Biological Techniques)

Section: Semester I

Unit I: Forensic Botany

No. of Hours Allotted: 15

Name of the Teacher: Mrs. G. Sowmya

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Introduction and Definition of Forensic Biology |
| 2 | Scope of Forensic Biology |
| 3 | Forensic Botany: Definition and scope |
| 4 | Identification and matching of various forms of botanical evidences such as wood |
| 5 | Seeds |
| 6 | Leaves |
| 7 | Study and identification of pollen grains |
| 8 | Identification of starch grains and stains of spices |
| 9 | Paper pulp identification |
| 10 | Toxic principles of plants and their forensic significance |
| 11 | Identification of poisonous plants in India |
| 12 | Identification of poisonous mushrooms of India |
| 13 | Types and morphology of diatoms |
| 14 | Methods of isolation from tissues and bones |
| 15 | Forensic significance of diatoms in drowning cases |

Class: M.Sc. Forensic Science Course/Paper:III/FS 103T (Forensic Biology & Biological Techniques)

Section: Semester I

Unit II: Hair examination, Fiber examination and Forensic Entomology

No. of Hours Allotted: 15

Name of the Teacher: Mrs. G. Sowmya

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Introduction, Structure, Growth and Chemistry of hair |
| 2 | Identification and comparison of hair by microscopic, chemical, biochemical and |
| | instrumental methods |
| 3 | Identification of human hair and animal hair |
| 4 | Assessment of age, sex, race, site of hair, analysis of drugs and elements in hair, hair |
| | diseases |
| 5 | Hair transfer, persistence and recovery |
| 6 | DNA typing of hair |
| 7 | Introduction and Classification of fibres |
| 8 | Identification and comparison of fibres by physical, chemical, microscopic, spectroscopic, |
| | chromatographic methods |
| 9 | Persistence and recovery of fibres, Forensic significance of fibre examination |
| 10 | Definition, divisions and role of forensic entomologist |
| 11 | Analyzing crime scene for entomological evidence |
| 12 | Collection of climatological data and entomological specimen before body removal |
| 13 | Common arthropods found on the dead body |
| 14 | Determination of time since death |
| 15 | Entomological succession |

Class: M.Sc. Forensic Science Course/Paper:III/FS 103T (Forensic Biology & Biological Techniques)

Section: Semester I

Unit III: Wildlife Forensics and Microscopy

No. of Hours Allotted: 15

Name of the Teacher: Ms. Manisha Keshavan

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Introduction, Importance of wildlife, Census of wildlife population |
| 2 | Endangered and extinct species |
| 3 | Wildlife Protection Act and CITES |
| 4 | Types of wildlife crime, Methods of smuggling and poaching of wildlife artifacts |
| 5 | Crime scene search |
| 6 | Wildlife crime investigation |
| 7 | Determination of time of death and Sex determination from bones |
| 8 | Identification of teeth, claws, Ivory, Horns, antlers, fur, skin, bite marks, pugmarks |
| 9 | Identification of blood, excreta and bones by biochemical and immunological methods |
| 10 | Basic principles and applications of: Simple and Compound Microscope |
| 11 | Comparison Microscope |
| 12 | Phase Contrast Microscope and Stereo Microscope |
| 13 | Basic principles and applications of Polarizing Microscope |
| 14 | Fluorescent Microscope, Infra-red Microscope |
| 15 | Scanning Electron Microscope and Transmission Electron Microscope |

 Class: M.Sc. Forensic Science
 Section: Semester I

 Course/Paper:IV/FS 104T (Forensic Physics, Forensic Photography & Forensic Engineering)

Unit I: Forensic Examination of Physical Evidences

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Definition of glass, Types of glass and their composition |
| 2 | Forensic examination of glass fractures under, Physical examination and Elemental analysis |
| | of glass evidence |
| 3 | Interpretation and discussion on important case studies of glass evidence |
| 4 | Nature, Distribution and Origin of soil materials in the Forensic comparison of soil |
| 5 | Methods of characterizing and fingerprinting soil for Forensic application |
| 6 | Interpretation of soil evidence and discussion on important case studies of soil evidence |
| 7 | Definition of paint, Types of paint and their composition |
| 8 | Macroscopic and microscopic studies, Micro-chemical analysis and instrumental analysis of |
| | paint evidence |
| 9 | Interpretation of paint evidence and discussion on important case studies of paint evidence |
| 10 | Definition of tool marks, Types and characteristics of tool marks |
| 11 | Tracing and lifting of marks |
| 12 | Photographic examination of tool marks |
| 13 | Scope & importance of restoration of tool marks |
| 14 | Methods of obliteration of tool marks |
| 15 | Restoration of tool marks |

Class: M.Sc. Forensic ScienceSection: Semester ICourse/Paper:IV/FS 104T (Forensic Physics, Forensic Photography & Forensic Engineering)

Unit II: Forensic Photography

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Introduction and scope of photography in forensic investigation |
| 2 | Cardinal rules of crime scene photography |
| 3 | Types of photographs |
| 4 | Cameras, lenses, filters, films, exposing, development & printing |
| 5 | Light as a Forensic Photographer's Tool |
| 6 | Photography using scientific equipment |
| 7 | Introduction and history of digital imaging |
| 8 | Digital image processing operations |
| 9 | Classes of imaging operations and noise reduction |
| 10 | Introduction and scope of digital photography |
| 11 | Software for digital photography |
| 12 | Laws relating to digital evidence and its admissibility |
| 13 | Blood stain photography |
| 14 | Imprint and impressions photography |
| 15 | Photography of shooting incident and fire scene |

Class: M.Sc. Forensic ScienceSection: Semester ICourse/Paper:IV/FS 104T (Forensic Physics, Forensic Photography & Forensic Engineering)

Unit III: Forensic Engineering

No. of Hours Allotted: 15

Name of the Teacher: Ms. Manisha Keshavan

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Definition of forensic engineering, Scope and importance of Forensic engineering |
| 2 | Types of forensic engineering investigations |
| 3 | Duties and responsibilities of forensic engineer |
| 4 | Legal concerns after failure |
| 5 | Engineering investigation of failures |
| 6 | Litigation and dispute resolution |
| 7 | Examination of concrete structures |
| 8 | Examination of steel structures |
| 9 | Examination of structural foundations |
| 10 | Examination of electrical wires |
| 11 | Causes of electric failures |
| 12 | Cable accessory failure analysis |
| 13 | Aircraft accident investigation |
| 14 | Vehicular accident investigation |
| 15 | Environmental disaster investigation with case studies |

Class: M.Sc. Forensic ScienceSection: Semester ICourse/Paper:I/FS 151P (Crime Scene Management & Forensic Psychology Lab)No. of Sessions Allotted: 15 (Each 4 hours)

Name of the Teacher: Batch I: Ms. Manisha Keshavan Batch II: Mr. M. Mahesh

| Session | Topics to be covered |
|---------|---|
| No. | |
| 1 | Sketching of Outdoor crime scene |
| 2 | Sketching of Indoor crime scene |
| 3 | Photography of crime scene |
| 4 | Collection and packing of physical evidence at the crime scene |
| 5 | Forwarding of physical evidence |
| 6 | Reconstruction and evaluation of outdoor crime scene |
| 7 | Reconstruction and evaluation of indoor crime scene |
| 8 | Physical evidence and Locard's exchange principle |
| 9 | Span of attention |
| 10 | Rote learning versus Meaningful learning |
| 11 | Recall and recognition |
| 12 | Personality test: Rosenberg self-esteem scale |
| 13 | Perceived stress scale |
| 14 | Thematic apperception test and Rorschach ink blot test (Demonstration only) |
| 15 | Polygraphy (Demonstration only) |

Class: M.Sc. Forensic Science Course/Paper:II/FS 152P (Instrumental Methods of Analysis Lab) No. of Sessions Allotted: 15 (Each 4 hours) Section: Semester I

Name of the Teacher: Batch I: Ms. Manisha Keshavan Batch II: Mr. M. Mahesh

| Session | Topics to be covered |
|---------|--|
| No. | |
| 1 | Verification of Beer's law and calculation of molar absorption coefficients for CuSO4 |
| 2 | Verification of Beer's law and calculation of molar absorption coefficients for KMnO4 |
| 3 | Estimation of salicylic acid by colorimetry |
| 4 | Conductometric titration of strong acid vs. strong base |
| 5 | Conductometric titration of weak acid vs. strong base |
| 6 | Conductometric titration of mixture of acids vs. strong base |
| 7 | Potentiometric titration of strong acid vs. strong base |
| 8 | Potentiometric titration of weak acid vs. strong base |
| 9 | Potentiometric redox titration of potassium dichromate-ferric ammonium sulphate |
| 10 | Potentiometric precipitation titration of Ag+ vs. KCl |
| 11 | Separation of amino acids by Paper Chromatography |
| 12 | Separation of alkaloids by Thin Layer Chromatography |
| 13 | Paper electrophoresis for separation of amino acids |
| 14 | Agarose gel electrophoresis for separation of proteins |
| 15 | Simultaneous estimation of Ibuprofen and Paracetamol by UV spectroscopy (Demonstration |
| | only) |

Class: M.Sc. Forensic Science Course/Paper:III/FS 153P (Forensic Biology Lab) No. of Sessions Allotted: 15 (Each 4 hours) Section: Semester I

Name of the Teacher: Mr. M. Mahesh

| Session | Topics to be covered |
|---------|---|
| No. | |
| 1 | Isolation and identification of diatoms |
| 2 | Isolation and identification of pollen grains |
| 3 | Identification of starch grains |
| 4 | Microscopic and chemical comparison of paper pulp |
| 5 | Identification of stains of spices |
| 6 | Morphological and microscopic characteristics of Datura |
| 7 | Morphological and microscopic characteristics of Cannabis |
| 8 | Morphological and microscopic characteristics of Nerium |
| 9 | Morphological and microscopic examination of human hair and animal hair |
| 10 | Examination of scale patterns of human hair |
| 11 | Physicochemical and microscopic examination of natural fibres |
| 12 | Physicochemical and microscopic examination of artificial fibres |
| 13 | Analysis of dyes of fibres by Thin Layer Chromatography |
| 14 | Study of Salient features of Wildlife Protection Act |
| 15 | Microscopic examination of botanical evidence by Scanning Electron Microscope |

Class: M.Sc. Forensic Science Course/Paper: IV/FS 154P (Forensic Physics, Forensic Photography & Forensic Engineering Lab) No. of Sessions Allotted: 15 (Each 4 hours) Section: Semester I

| Session | Topics to be covered |
|---------|--|
| No. | |
| 1 | Examination of glass fractures |
| 2 | Determination of refractive indices of glass by submersion method |
| 3 | Determination of density of glass by densitometer method and density gradient method |
| 4 | Elemental analysis of glass and soil evidence by SEM-EDX |
| 5 | Physicochemical analysis of soil |
| 6 | Soil comparison by ignition method and particle size distribution method |
| 7 | Soil comparison by density gradient method |
| 8 | Physical examination of paint evidence |
| 9 | Examination of paint samples by Microchemical and solubility test |
| 10 | Comparison of paint sample by TLC |
| 11 | Develop tool marks by various tools and compare them |
| 12 | Restoration of erased identification marks from metal surfaces/wood surfaces |
| 13 | Determination of adulteration of cement by chemical test |
| 14 | Examination of electric wires |
| 15 | Identification of cameras from film negatives |



LESSON PLANS FOR THE ACADEMIC YEAR 2023-2024

M.Sc. FORENSIC SCIENCE

Semester II

(CCE Syllabus)

Class: M.Sc. Forensic Science Course/Paper: I/FS 201T (Imprints, Impressions & Biometrics)

Section: Semester II

Unit I: Imprints

No. of Hours Allotted: 15

Name of the Teacher: Ms. Kanchan Singh

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Introduction, History, elements of fingerprints, Classification of Fingerprints (Henry |
| | Classification, Patterns & Types) |
| 2 | Identification and comparison of fingerprints |
| 3 | Digital imaging of fingerprints and AFIS |
| 4 | Development, lifting and preservation of Latent fingerprints on porous and non-porous |
| | surfaces |
| 5 | Development of fingerprints on adhesive surfaces, Development of fingerprints with blood |
| | and grease contamination |
| 6 | Development of latent fingerprints on dead body and of the dead body |
| 7 | Lip Prints: Introduction, History, Scope and Classification |
| 8 | Recording, processing and development of lip prints |
| 9 | Application of lip prints in crime detection and court of law |
| 10 | Ear Prints: Introduction and History, Morphology and shapes of ear |
| 11 | Location of ear prints, producing standards from suspects |
| 12 | Identification and comparison of ear prints |
| 13 | Palm Prints: Introduction, anatomical areas and major creases of the palm |
| 14 | Interdigital area, Hypothenar area, Thenar area and Finger joints |
| 15 | Palm print comparison |

Class: M.Sc. Forensic Science Course/Paper: I/FS 201T (Imprints, Impressions & Biometrics)

Unit II: Impressions

No. of Hours Allotted: 15

Section: Semester II

Name of the Teacher: Ms. Singaraju Manasa

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Introduction and types of foot and footwear impressions |
| 2 | Information from footwear impressions and footprints |
| 3 | Location, recovery, enhancement and comparison of foot and footwear impressions |
| 4 | Tire Impressions: Introduction to tire impressions and types of tires |
| 5 | Tread nomenclature and sidewall information, Tread wear indicators |
| 6 | Tire track evidence recovery and examination process |
| 7 | Bite Mark Impressions: Introduction and Significance of bite marks |
| 8 | Judicial Acceptance of bite marks in courtroom, Evidence collection |
| 9 | Identification and comparison of bite marks |
| 10 | Iris Impressions: Introduction and scope of iris impressions |
| 11 | Morphology of iris, genetics of iris pattern, color and patterns of iris |
| 12 | Iris as means of personal identification |
| 13 | Rubber stamp impressions, Metallic seal impressions, Embossed impressions |
| 14 | Indentation marks, Cast engraved and punched marks |
| 15 | Methods of restoration |

Class: M.Sc. Forensic Science Course/Paper: I/FS 201T (Imprints, Impressions & Biometrics)

Unit III: Biometrics

Section: Semester II

No. of Hours Allotted: 15

Name of the Teacher: Ms. Kanchan Singh

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Biometrics: Introduction and history of biometrics |
| 2 | Operation of biometric system and characteristics |
| 3 | Applications of biometrics |
| 4 | Finger print and Palm Recognition: Fingerprint image processing |
| 5 | Minutiae determination and fingerprint matching |
| 6 | Palm print classification and datum point determination |
| 7 | Iris Recognition: Introduction, Iris Recognition |
| 8 | Coordinate System |
| 9 | Texture Energy Feature |
| 10 | Face Recognition: Introduction, Detection and Location of Faces, Features |
| 11 | Extraction and Face Recognition |
| 12 | Dual Eigen spaces method for face recognition |
| 13 | Gait Recognition: Introduction to gait recognition |
| 14 | Temporal alignment and shape-based recognition approaches |
| 15 | Silhouette Quality and Gait Recognition |

Class: M.Sc. Forensic Science Course/Paper: II/FS 202T (Forensic Chemistry)

Section: Semester II

Unit I: Forensic Chemistry

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Forensic Chemistry: Introduction, Types of cases / exhibits, Preliminary screening, |
| | Presumptive tests (colour and spot tests) |
| 2 | Chemical fertilizers (Nitrogen, Phosphorus, Potassium) |
| 3 | Insecticides (Endosulfan, Malathion, Carbaryl) |
| 4 | Metallurgical analysis (Fe, Cu, Zn, Au, Ag) |
| 5 | Natural products (tobacco, tea, sugars, rubber) |
| 6 | Industrial chemicals and solvents: Sulphuric, Nitric and Hydrochloric |
| | acids, Sodium, Potassium hydroxide, Methanol, Ethanol, Acetone, Chloroform and Ether |
| | with reference to forensic work |
| 7 | Distillation and fractionation of petroleum products; various fractions and their commercial |
| | uses |
| 8 | Standard methods of analysis of petroleum products |
| 9 | Analysis of petroleum products for adulteration |
| 10 | Chemistry of fire, Causes of fire |
| 11 | Investigation and evaluation of fires |
| 12 | Analysis of arson residues by conventional and instrumental methods |
| 13 | Introduction and scope of trace evidence analysis |
| 14 | Methods of collection of trace evidences |
| 15 | Analysis methods of various trace evidences (Trap related evidence materials, Dyes and |
| | pigments, Oils and fats, Industrial dusts) |

Class: M.Sc. Forensic Science Course/Paper: II/FS 202T (Forensic Chemistry)

Section: Semester II

Unit II: NDPS & Alcoholic beverages

No. of Hours Allotted: 15

Name of the Teacher: Dr. T. Sowmyya

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Introduction; Definition of drug and drug abuse |
| 2 | Classification of NDPS (Form and origin; Pharmacological classification) |
| 3 | Drug abuse in sports |
| 4 | Drug profiling |
| 5 | Designer Drugs (Introduction and classes of designer drugs) |
| 6 | Clandestine laboratories |
| 7 | Analysis of Opiates (Morphine; Codeine; Heroin) |
| 8 | Analysis of Cannabis (Introduction; Cannabis forms; Active principle; Tests) |
| 9 | Stimulants (Cocaine; Amphetamines, MDMA) |
| 10 | Analysis of Hallucinogens (LSD, Psilocybin, Mescaline) |
| 11 | Barbiturates; Benzodiazepines, Disubstituted Quinalozones |
| 12 | Legal aspects of drugs of abuse (Dangerous Drugs Act; Drugs and Cosmetic Act; Excise |
| | Act; NDPS Act) |
| 13 | Common terminology (Beverage; Proof; Extract; Alcoholic beverage; Non-alcoholic |
| | beverage) |
| 14 | Manufacture, composition and analysis of alcoholic and non- alcoholic beverages |
| 15 | Country made liquor; Illicit liquor; Common adulterants and toxic substances in alcoholic |
| | beverages |

Class: M.Sc. Forensic Science Course/Paper: II/FS 202T (Forensic Chemistry)

Section: Semester II

Unit III: Explosives

No. of Hours Allotted: 15

Name of the Teacher: Dr. T. Sowmyya

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Introduction, Definition of explosion, explosive, use of explosives |
| 2 | Historical timeline of explosives |
| 3 | Composition and characteristics of explosives |
| 4 | Classification of explosives, Pyrotechnics, IEDs, Plastic explosives |
| 5 | Explosion process (Burning, deflagration, detonation) |
| 6 | Explosion effects |
| 7 | Approach to scene of explosion, Post blast explosion residue collection |
| 8 | Reconstruction of sequence of events |
| 9 | Evaluation and assessment of scene of explosion |
| 10 | Extraction of explosion residues |
| 11 | Chemical tests |
| 12 | Instrumental methods (Analysis of Picric acid; Gun powder; Ammonium nitrate; NG,NC, |
| | TNT, PETN, TETRYL, RDX and HMX) |
| 13 | Synthesis of primary explosives, secondary explosives and low explosives |
| 14 | Explosives Act and Explosive Substances Act |
| 15 | Profiling and Tagging of explosives, Interpretation of results |

Class: M.Sc. Forensic Science Course/Paper: III/FS 203T (Forensic Anthropology & Forensic Medicine)

Section: Semester II

Unit I: Forensic Anthropology

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Structure of bones |
| 2 | Types and formation of bones |
| 3 | Study of human skeletal system |
| 4 | History, Scope and development of anthropology, Role of forensic anthropologist |
| 5 | Determination of sex and stature from skeletal remains |
| 6 | Determination of age and race from skeletal remains, Bone pathology and forensic |
| | significance |
| 7 | Portrait Parle/Bertillon system, Somatoscopy and Somatometry |
| 8 | Superimposition technique, Facial reconstruction and Video image analysis |
| 9 | Personal identification from skeletal remains in mass disaster cases |
| 10 | Introduction to Forensic Odontology |
| 11 | Structure and types of teeth, Dentition and dental formula |
| 12 | Dental diseases |
| 13 | Determination of age from teeth |
| 14 | Determination of sex and race from teeth |
| 15 | Role of teeth in mass disaster, Forensic significance in personal identification |

Class: M.Sc. Forensic Science Course/Paper: III/FS 203T (Forensic Anthropology & Forensic Medicine)

Section: Semester II

Unit II: Forensic Medicine - I

No. of Hours Allotted: 15

Name of the Teacher: Dr. Sundaragiri Suraj

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Introduction, history and scope of Forensic Medicine |
| 2 | Qualification and role of Forensic Medical Examiner |
| 3 | Personal identification of living and dead |
| 4 | Thanatology: Definition, causes, modes and medico legal aspects of death |
| 5 | Postmortem examination (autopsy), Exhumation |
| 6 | Postmortem changes and their importance in determination of time after death |
| 7 | Traumatology: Definition and types of injuries |
| 8 | Mechanical injuries (Types, causes, and medico legal aspects) |
| 9 | Thermal injuries (Types, causes, and medico legal aspects) |
| 10 | Sexual offences, Pregnancy, Abortion and Delivery: Introduction, types and medico legal |
| | aspects of sexual offences, examination of victim and suspect |
| 11 | Introduction and medico legal aspects of pregnancy and delivery |
| 12 | Introduction, types and medico legal aspects of abortion and MTP act |
| 13 | Infanticide: Definition of infanticide, types of infant birth, signs of live birth |
| 14 | Medico legal aspects of infanticide |
| 15 | Battered baby syndrome, sudden infant death syndrome and Munchausen's syndrome |

Class: M.Sc. Forensic Science Course/Paper: III/FS 203T (Forensic Anthropology & Forensic Medicine)

Section: Semester II

Unit III: Forensic Medicine - II

No. of Hours Allotted: 15

Name of the Teacher: Dr. K. Lakshmikanth Reddy

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Examination of decomposed bodies |
| 2 | Examination of mutilated bodies |
| 3 | Examination of burnt bodies |
| 4 | Deaths from Poisoning and Starvation: Definition and types of poisoning |
| 5 | Medico legal aspects of poisoning |
| 6 | Causes and medico legal aspects of starvation |
| 7 | Mechanical Asphyxia and Drowning: Definition and types of mechanical asphyxia |
| 8 | Medico legal aspects of asphyxia |
| 9 | Definition, types and medico legal aspects of drowning |
| 10 | Death due to Lightning and Electrocution: Definition of lightning and electrocution |
| 11 | Types of burns in lightning and electrocution |
| 12 | Medico legal aspects of lightning and electrocution |
| 13 | Deaths Associated with Surgery, Anaesthesia and Blood Transfusion: Introduction, |
| | Classification of patients by American Society of Anaesthesiologists |
| 14 | Causes and medico legal aspects of death during surgery, blood transfusion hazards and |
| | risks |
| 15 | Immunological and non-immunological reactions, Investigation of transfusion reactions |

Class: M.Sc. Forensic Science Course/Paper: IV/FS 204T (Forensic Ballistics)

Section: Semester II

Unit I: Introduction to Forensic Ballistics

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Introduction, history and scope of forensic ballistics |
| 2 | Classification of fire arms based on various parameters |
| 3 | Role of forensic ballistic examiner, Arms act |
| 4 | Constructional features of Standard firearms |
| 5 | Improvised firearms, country made firearms |
| 6 | Imitative fire arms |
| 7 | Introduction, types of ammunition, Classification and construction features of different |
| | types of cartridges |
| 8 | Types of primers, priming composition, Propellants and their compositions |
| 9 | Types of bullets and compositional aspects |
| 10 | Trigger mechanism during firing process |
| 11 | Rifling and its significance in rifled firearms |
| 12 | Choke and its significance in smooth bore shot gun firearms |
| 13 | Techniques of dismantling / assembling of fire arms |
| 14 | Safety aspects of handling fire arms and ammunitions |
| 15 | Do and don't while handling firearms and its ammunition |

Class: M.Sc. Forensic Science Course/Paper: IV/FS 204T (Forensic Ballistics)

Section: Semester II

Unit II: Categories of Gun Ballistics

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|---|
| No. | |
| 1 | Definition and introduction of internal ballistics |
| 2 | Process of Ignition of propellant |
| 3 | Definition, measurement and factors affecting the recoil velocity |
| 4 | Definition and introduction of intermediary ballistics |
| 5 | Effects on the motion of projectile and firearm |
| 6 | Muzzle blast, flash and silencers |
| 7 | Definition and introduction of external ballistics |
| 8 | Determination of trajectory of projectiles |
| 9 | Factors affecting the trajectory of projectile |
| 10 | Definition and introduction of terminal ballistics |
| 11 | Effect of projectile on hitting the target and Function of bullet shape |
| 12 | Ricochet and its effects and factors affecting the wound characteristics |
| 13 | Definition of wound ballistics, Threshold velocity for penetration of skin, flesh, bones, |
| | Nature of wounds |
| 14 | Evaluation of injuries caused due to shot gun, rifle, handguns and country made firearms |
| 15 | Methods of measurement of wound ballistic parameters, ante mortem and postmortem |
| | injuries |

Class: M.Sc. Forensic Science Course/Paper: IV/FS 204T (Forensic Ballistics)

Section: Semester II

Unit III: Identification of Firearms and GSR Residue Analysis

No. of Hours Allotted: 15

| Lecture | Topics to be covered |
|---------|--|
| No. | |
| 1 | Principles and Practice of firearm identification |
| 2 | Different types of marks produced during firing process on cartridge and on bullet - |
| 3 | Techniques for obtaining test material from various types of weapons, Linkage of fired |
| | cartridges and bullets with test fired cartridge and bullet |
| 4 | Range of fire |
| 5 | Time of firing, Angle of firing |
| 6 | Direction of firing |
| 7 | Automatic Trajectory, Bullet and Cartridge Comparison system: Ballistic Data Acquisition |
| | system |
| 8 | Automated management of ballistics data (NIBIN and IBIS), History of establishment |
| 9 | Brass Trax, Bullet Trax & Match Point etc., Limitation, Advantages and Applications |
| 10 | Mechanism of formation of GSR |
| 11 | Identification of shooter |
| 12 | Collection and analysis (classical and Instrumental methods) of GSR analysis |
| 13 | Reconstruction and interpretation of suicide, murder, accidental and self-defense cases |
| 14 | Forensic report writing in shooting incidents |
| 15 | Courtroom testimony in shooting incidents |

Class: M.Sc. Forensic Science

Course/Paper: I/FS 251P (Imprints, Impressions & Biometrics Lab) No. of Sessions Allotted: 15 (Each 4 hours) Section: Semester II

Name of the Teacher: Batch I: Mr. M. Mahesh Batch II: Ms. Kanchan Singh

| Session | Topics to be covered |
|---------|---|
| No. | |
| 1 | To develop latent fingerprints using powder methods and tape lifting |
| 2 | Development of latent fingerprints with iodine fuming and chemical methods |
| 3 | Prepare plain and rolled inked fingerprints on fingerprint slip to perform Henrys |
| | classification |
| 4 | Identification of ridge characteristics and classify fingerprints |
| 5 | Comparison of fingerprints |
| 6 | Lip prints - Photography, lifting and comparison |
| 7 | Ear prints - Photography, lifting and comparison |
| 8 | Footprint tracing, casting and comparison |
| 9 | Identification and comparison of footwear impressions |
| 10 | Sole prints lifting from the crime scene and their comparison |
| 11 | Bite marks casting and comparison |
| 12 | Tire print tracing, casting and comparison |
| 13 | Restoration of erased identification marks from metal surfaces |
| 14 | To perform gait pattern analysis and study the gait characteristics |
| 15 | To study the practical working and handling of Biometric devices & AFIS (Demo) |

Class: M.Sc. Forensic Science Course/Paper: II/FS 252P (Forensic Chemistry Lab) No. of Sessions Allotted: 15 (Each 4 hours) Section: Semester II

| Session | Topics to be covered |
|---------|--|
| No. | |
| 1 | Analysis of natural products (Tobacco/Sugars/Tea) |
| 2 | Analysis of Corrosive chemicals: Hydrochloric acid, Sulphuric acid, Nitric acid and alkalis |
| 3 | Analysis of Phenolphthalein in trap cases |
| 4 | Analysis of Dyes and Pigments |
| 5 | Forensic analysis of oils and fats |
| 6 | Analysis of adulteration of Petroleum products |
| 7 | Forensic analysis of arson related evidences |
| 8 | Examination of NDPS drugs by colour/spot and microcrystalline test |
| 9 | Analysis of NDPS by Thin Layer Chromatography |
| 10 | Quantitative drug analysis by UV-Visible spectrophotometry |
| 11 | Chemical analysis of liquors |
| 12 | Extraction and detection of inorganic explosive / explosion residues by spot/ colour tests |
| 13 | Extraction and detection of organic explosive / explosion residues by spot/ colour tests and |
| | TLC |
| 14 | IR spectroscopy of samples of forensic interest (Demonstration only) |
| 15 | Determination of a drug / explosive of forensic interest by HPLC/GC- MS / LC- MS of a |
| | drug of forensic interest (Demonstration only) |

Class: M.Sc. Forensic Science

Section: Semester II

Course/Paper: III/FS 253P (Forensic Anthropology & Forensic Medicine Lab) No. of Sessions Allotted: 15 (Each 4 hours)

> Name of the Teacher: Batch I: **Dr. T. Sowmyya** Batch II: **Dr. Sundaragiri Suraj** / **Dr. K. Lakshmikanth Reddy**

| Session | Topics to be covered |
|---------|---|
| No. | |
| 1 | Study of human skeletal system |
| 2 | Determination of sex from skull |
| 3 | Determination of sex from pelvic girdle |
| 4 | Determination of sex from mandible |
| 5 | Determination of age from skull |
| 6 | Determination of age from teeth |
| 7 | Estimation of stature from long bones |
| 8 | Personal identification by Bertillon system |
| 9 | Personal identification by superimposition technique |
| 10 | Study of identification methods (Fingerprints, Tattoo marks, Deformities, Hair, mole and |
| | scars) |
| 11 | Demonstration of Instruments used for conducting autopsy (Dissection Set) |
| 12 | Medico legal autopsy of different cases of death – External examination (Demo) |
| 13 | Medico legal autopsies of different cases of death – Internal examination (Demo) |
| 14 | Study of dead body at autopsy for sign of death, cause of death, manner of death and time |
| 15 | Proformas for demonstration of Post mortem report, Death Certificate, Sexual offence |
| | certificate and Summons |

Class: M.Sc. Forensic Science Course/Paper: IV/FS 254P (Forensic Ballistics Lab) No. of Sessions Allotted: 15 (Each 4 hours) Section: Semester II

Name of the Teacher: Mr. M. Mahesh

| Session | Topics to be covered |
|---------|---|
| No. | |
| 1 | Characteristics of Firearms Calibre, Choke, Trigger pull, Proof marks etc. |
| 2 | Identification of parts and action mechanism of shot gun |
| 3 | Identification of parts and action mechanism of rifles (Revolver, Pistol, AK47, etc.) |
| 4 | Study of Muzzle loaders |
| 5 | Study of ammunition of shotgun |
| 6 | Study of ammunition of rifled firearms |
| 7 | Examination and Comparison of fired bullets Calibre, rifling characteristics, probable type |
| | of firearms |
| 8 | Examination and Comparison of fired Cartridges/cases (Calibre, firing pin, breech face, |
| | Extractor / Ejector marks etc.) |
| 9 | Determination of shot number from size and weight of shots |
| 10 | Identification of types of bullets |
| 11 | Identification of propellants |
| 12 | Determination of range of firing |
| 13 | Chemical tests for powder residues (Walker's test) and Barrel wash |
| 14 | Determination of bullet entry and exit hole on glass pane |
| 15 | Test firing of bullets and its comparison (Demonstration only) |