Program Structure and Syllabus
for
M.Sc. Forensic Science
Questioned Documents and Fingerprints

2021-22 Onwards

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
BOARD OF STUDIES MEETING – FORENSIC SCIENCE

Date: 28-10-2021

AGENDA:

1. Eligibility and Entrance Examinations
2. Syllabus finalization
3. Syllabus for practicals
4. Number of teaching hours / Periods theory / Practicals
5. Model Question Papers
6. Credits / Evaluation
7. Scheme of Valuation
8. List of Examiners for paper setting
9. List of Practical Examiners

Members:

1. Dr. D. Kalyani, Asst. Prof.,
   Dept. of Zoology, AKNU, RJY, - **Chairman**

2. Mr.E.Mohan, Principal,
   Aditya Degree College, Surampalem - **Convener**

3. Dr. N. Kala Bhaskar, Asst. Prof.
   University of Madras, Chennai - **Member**

4. Dr. Komal Saini, Professor,
   Panjabi University - **Member**

5. Dr. P. Uma Maheshwara Rao, Prof. & Head,
   Forensic Medicine & Toxicology,
   Rangaraya Medical College, Kakinada - **Member**

6. Dr. Satyan, Scientist (Retd),
   CFSL Hyderabad - **Member**

RESOLUTIONS:

The common Board consisting of the above members have met on blended mode in the O/o Dean, Academic Affairs, Adikavi Nannaya University, Rajamahendravaram on 28/10/2021 and considered the enclosed agenda. After thorough deliberations and discussions, the Board members have resolved the following.

1. A B.Sc. graduate with "Chemistry or Forensic Science" as one of the subjects is eligible to apply for admission into M.Sc. Forensic Science-Questioned Documents and Fingerprints.

2. A B.Sc. graduate with "Chemistry or Forensic Science" as one of the subjects is eligible to apply for admission into M.Sc. Forensic Science - Chemistry and Toxicology.

3. A B.Sc. graduate with "Biology or Forensic Science" as one of the subjects is eligible to apply for admission into M. Sc. Forensic Science - DNA Finger Printing.

4. A B.Sc. graduate with "Computer Science or Forensic Science" as one of the subjects is eligible to apply for admission into M.Sc. Cyber Security.

5. A B.Sc. graduate with "Computer Science or Forensic Science" as one of the subjects is eligible to apply for admission into M.Sc. Digital Forensics and Information Security.

6. The members formulated the syllabus for M.Sc Forensic Science, a 2 year program on par with other Universities in the Country to be implemented from academic year 2021-22.

7. The syllabus for practicals of the above courses was formulated on par with UGC model curriculum.

8. There shall be 4 to 5 hours per week for each theory paper & 3 hrs for each practical.

9. I & II Semesters are common for M.Sc Forensic Science - Questioned Documents & Fingerprints, M.Sc Forensic Science - Chemistry and Toxicology, M.Sc Forensic Science - DNA Finger Printing

10. III Semester is having specialization i.e, Questioned Documents & Fingerprints in M.Sc Forensic Science - Questioned Documents & Fingerprints, Chemistry and Toxicology in M.Sc Forensic Science - Chemistry and Toxicology, DNA Finger Printing in M.Sc Forensic Science - DNA Finger Printing.

11. IV Semester will be project cum Internship for all M.Sc. Programs M.Sc Forensic Science - Questioned Documents & Fingerprints, M.Sc Forensic Science - Chemistry and Toxicology, M.Sc Forensic Science - DNA Finger Printing, M.Sc. Cyber Security, M.Sc. Digital Forensics and Information Security.

12. Marks and credits are allotted to theory & practical papers in each semester. There will be 100 marks for each theory, and 200 marks for 2 practicals each 100 marks and total marks for each semester 600 x 4 semester 2400 marks.

13. Examination pattern will be as follows.

a) Each theory paper will be evaluated for 100 marks out of which75% of marks, for Semester End Examination (SEE) while the remaining 25% marks for Continuous Internal Assessment (CIA)

Continuous Internal Assessment		
S. No	Scheme of Evaluation	Marks
1	Mid-Semester Examination	10M
2	Assignment/Seminar Presentation	5M
3	Attendance	5M
4	Swachhata Activity	5M
Total		25M

Details of Attendance Marks		
S.No	Attendance	Marks Allotted
1	95% above	5
2	85-94%	4
3	75-84%	3
4	65-74%	2
5	55-64%	1
6	< 54%	0
Total		25M

b) The Semester End Examination question paper comprises of two sections –Section A & B, Section A consists of 4 questions one question from each unit of syllabus with internal choice 'a' or 'b'. Section-B consists of 8 short questions two from each unit of the syllabus, with internal choice out of which only 5 are to be attempted

c) Similarly, each practical will be evaluated for a total of 100 marks, out of which 75% of marks for Semester End Examination (75 Marks) and 25% (25 Marks) for Continuous Internal Assessment.

14. A comprehensive viva-voce will be conducted for students at the end of IV Semester for 100 marks carrying 4 credits.

15. IV Semester Students should do their project cum internship at Forensic Science Laboratories, Police Stations, Cyber cells, Fingerprint Bureau, National Crime Records Bureau, National Forensic Sciences University, Rashtriya Raksha University, Directorate of Forensic Science Services, Centre for Development of Advanced Computing (C-DAC), National Institute of Nutrition, Centre for DNA Fingerprinting and Diagnostics – CDFD, Council of Scientific And Industrial Research–Centre for Cellular and Molecular Biology (CSIR–CCMB), Indian Institute of Chemical Technology (CSIR-IICT), Central Detective Training Institute, etc. and thesis must be submitted to the college and University.

M.Sc. Forensic Science
SEMESTER END EXAMINATION
Theory Model Question Paper pattern

Time: 3 hrs **Max. Marks: 75**

Section-A

Answer all questions. Each question carries 15 marks. **4x15=60**

Q1. Unit-1

a or b

Q2. Unit-2

a or b

Q3. Unit-3

a or b

Q4. Unit-4

a or b

Section-B **5x3=15**

Q5. It contains 8 short questions with at least two from each unit, carrying 3 marks.

5 questions are to be answered.

M.Sc. Forensic Science Questioned Documents & Fingerprints
Scheme of Examination

Code	Title of the Paper	L @	P #	Total (Hrs)/ Week	Duration of Exam (hrs)	External Marks	Internal Marks	Total Marks	Credits
I Semester									
MSFS101	Forensic Science & Criminal Justice System	4	3	7	3	75	25	100	4
MSFS102	Forensic Science & Divisions	4	3	7	3	75	25	100	4
MSFS103	Crime Scene Management	4	3	7	3	75	25	100	4
MSFS104	Instrumentation	4	3	7	3	75	25	100	4
Lab Course									
MSFS105	Crime Scene Processing Lab				3	75	25	100	4
MSFS106	Instrumentation Lab				3	75	25	100	4
II Semester									
MSFS201	Forensic Medicine and Anthropology	4	3	7	3	75	25	100	4
MSFS202	Forensic Physics and Ballistics	4	3	7	3	75	25	100	4
MSFS203	Cyber Forensics	4	3	7	3	75	25	100	4
MSFS204	Psychology	4	3	7	3	75	25	100	4
Lab Course									
MSFS205	Forensic, Medicine & Anthropology Lab				3	75	25	100	4
MSFS206	Forensic Physics & Cyber Lab				3	75	25	100	4
III Semester									
MSFS331	Handwriting and Signature Examination	4	3	7	3	75	25	100	4
MSFS332	Advanced Questioned Document Examination	4	3	7	3	75	25	100	4
MSFS333	Introduction to Fingerprint Science	4	3	7	3	75	25	100	4
MSFS334	Advanced Fingerprint Examination	4	3	7	3	75	25	100	4
Lab Course									
MSFS335	Questioned Documents Lab				3	75	25	100	4
MSFS336	Fingerprint Lab				3	75	25	100	4
IV Semester									
MSFS431	Comprehensive viva-voce							100	4
MSFS432	Project					500	100	600	24
Total								2500	100

@ Lectures
# Practicals

M.Sc. Forensic Science

I Semester, Paper I

MSFS101- Forensic Science & Criminal Justice System

Aim and Objectives of Course: To Introduce fundamentals of Forensic Science, Concepts of Criminology, Laws pertaining to Criminal Justice System and Court Testimony.

Learning Outcomes

1. Fundamentals of Forensic Science and its development.
2. Significance of Criminology in Forensic Science.
3. Understanding Criminal Justice System.
4. Various agencies involved in CJS
5. Procedures and Significance of Court testimony.

Unit I- Forensic Science

Forensic Science – Introduction.History – Pioneers in Forensic Science.Principles of Forensic Science.Organization of Forensic Science Laboratories (Central & State) and other allied institutions -DFSS, CDTI, FPB, NCRB, BPR&D, CDFD, CCMB, IICT, NIN, LaCONES, CBI, NIA, CID, IB, SFIO, RAW NCB, CERT-Inetc. Duties of Forensic Scientists. Forensic Education in India – 1959 to 2020.

Unit II – Criminology

Introduction of Criminology, Social Change and Crime, Control and Prevention of Crime in context with Organization, Industrialization, Family set up, Criminal Behavior and Psychology.
Schools of Criminology, Theories of Criminology (Differential Association theory, Self-concept and containment theory, Labelling theory, Barrier theory, etc.), Punitive Aspects (Theories of punishment), Probation & Parole, Correctional Institutions.
Penology and its concepts.Victimology and its concepts.

Unit III- Criminal Justice System

Criminal Justice system in India – Introduction – Administration of civil and criminal courts – Hierarchy, Powers, Types.LokAyukta. Hierarchy of Police personnel in India - Functions and duties of police.Investigation of crimes and prosecution.Cognizable and Non- cognizable offences.Human Rights Commission – Guidelines for Forensic Investigation.Introduction to constitution of India – Fundamental Rights.Right to Information Act. Indian penal Code – Sections 171B, 171E, 291, 292, 293, 299, 300, 302, 304B, 308, 309, 362, 375, 376, 390, 391, 415, 420, 463, 465 - Criminal Procedure Code Introduction – Sections 291, 292, 293, 300 – Indian Evidence Act - Introduction – Sections 45, 46, 47, 57, 58, 60, 73, 135, 136, 137 and 159.

Unit IV

Report writing and evidence evaluation, Components of reports, report formats in respect of crime scene and laboratory findings.
Court testimony, admissibility of expert testimony, pre-court preparations and court appearance, examination – in chief, cross examination and re-examination, Discussion of complicated cases.

Reference Books:

1. Forensic Science in Criminal Investigation & Trails by B.R. Sharma – Universal Law Publishing.
2. An Introduction to Scientific and InvestigativeTechniques by James, S. H. and Nordby, J. J. CRC Press, 2003 & 2005
3. Forensic Science: Fundamentals and Investigations by Anthony J. Bertino - Cengage Learning, 2008
4. Introduction to Criminalistics: Thefoundation of Forensic Science by Barry A. J. Fisher, William J. Tilstone, Catherine Woytowicz - Elsevier
5. Criminal Major Acts 27th Edition 2018 by Padala Rama Reddi – Asia Law House Hyderabad.
6. Text Book of Criminology by VimalaVeeraraghavan – Selective & Scientific Books
7. Criminology, Penology & Victimology by Prof. N.V. Paranjape – Central Law Publication
8. Encyclopedia of Forensic Sciences Vol 1,2,3 by Jay A Siegel, Pekka J Saukko, Geoffrey C Knufer – Elsevier

M.Sc. Forensic Science

I Semester, Paper II

MSFS102- Forensic Science & Divisions

Aim and Objectives of Course: To acquire fundamental knowledge of various branches in Forensic Science and scope of Wildlife Forensic Science.

Learning Outcomes

1. To learn analysis of various evidence relevant to biology & chemistry.
2. To learn examination procedures of Questioned documents and Fingerprints
3. Applications of Forensic Science in Wildlife protection.

Unit - I :Biology

Introduction and Functions of Forensic biology.Importance, Preliminary and Confirmatory tests for Blood, Semen, Saliva, Urine, etc.Blood grouping systems.Examination of Hair and Fibre.Diatoms – Importance and Examination.Basics of DNA Fingerprinting.Introduction to Forensic Botany – Wood, leaves, seeds. Study of Pollen grains& Starch grains. Morphological and anatomical characteristics of Cannabis, Coca plants, Psilocybe mushrooms, Tobacco etc.

Unit – II : Chemical

Introduction and Functions of Forensic Chemistry.Chemistry of Fire. Explosives – Classification, Preliminary and Confirmatory tests for Explosive substance. Preliminary and Confirmatory tests for NDPS – Benzodiazepines, Phenethylamines, Hydroxyl derivatives, Methoxy derivatives, Tertiary amines, Tryptamines, etc. Examination of Petroleum products – Petrol, Diesel and Kerosene.Analysis of Alcoholic Beverages. Analysis of trace evidence – paint, dyes, etc.

Unit – III : Physical

Questioned Documents – History, Standard Documents – types.Introduction and Principles of Handwriting & Signatures.Alterations – Additions, Erasures, Overwritings, Obliterations. Secret writings, Printers and Printed document examination. Forgeries-types and detection. Instruments used in QDE– VSC, ESDA, etc.

Fingerprints – History, Types of Fingerprints, Fingerprint patterns, Development techniques– Chemical and Physical. Fingerprint identification and comparison. AFIS.

Unit – IV : Wildlife

Introduction and importance of Wildlife Forensics. Wildlife Protection act. Schedules I to VI of WPA.Wildlife crimes – Smuggling, poaching, hunting etc. Crime scene search, Criminal Investigation – Determination of time of death and sex determination from bones – Identification of teeth, claws, Ivory, Horns, antlers, furs, skin, bitemarks, pug marks – Identification of blood, excreta and bones by biochemical and immunological methods. Wildlife Protected and endangered species of animals and plants, Sanctuaries and their importance, Wild animals as pharmacopeias, Wildlife species commonly traded illegally.

Reference Books:

1. Forensic Science in Criminal Investigation & Trails by B.R. Sharma – Universal Law Publishing.
2. Criminalistics- An Introduction to Forensic Science 12th Edition by Richard Saferstein – Pearson
3. Forensic Biology by Richard Li – CRC Press
4. Essentials of Forensic Biology; Animals, Plants & Microorganisms in Legal Investigations by Gunn Allen – J. Wiley (2006)
5. Forensic Investigation of Explosives by Beveridge – Taylor & Francis (2000)
6. Basics of Forensic Chemistry by Javed I. Khan, Thomas J.Kennedy, DonellR.Christian, Jr – Humana Press
7. Forensic Analysis of Fire Debris and Explosives by Kenyon Evans-Nguyen and Katherine Hutches – Springer
8. Handwriting Identification Facts and Fundamentals – Huber &Headricks by Heidi H Harralson and Larry S Miller – CRC Press
9. The Fingerprint Sourcebook – NIJ
10. Wildlife Forensics Methods and Applications by Jane E. Huffman and John R. Wallace
11. Foundations of Forensic Document Analysis Theory and Practice by Michael Allen – Wiley Blackwell.
12. Encyclopedia of Forensic Sciences Vol 1,2,3 by Jay A Siegel, Pekka J Saukko, Geoffrey C Knufer– Elsevier
13. Wildlife Protection Act 1972 and its Amendments
14. Forensic Science in Wildlife Investigations – Linacre A

M.Sc. Forensic Science
I Semester, Paper III
MSFS103- Crime Scene Processing

Aim and Objectives of Course: Importance of Crime Scene Processing and Evidence for Investigation.

Learning Outcomes

1. Principles, Methods, Procedures of Crime Scene Processing.
2. Applications of Various Evidence Collection kits in Crime Scene.
3. Collection methods of Physical Evidence.

Unit I- Basic Principles of Crime SceneManagement

Definition of Crime and Crime Scene, Types of SoC, Planning, Organization and Coordination, Preservation of the Scene and evidence, Safety measures for evidence collection, Steps to be followed at SoC – Walk through, Protection, Search methods, Identification and Recognition of Physical Evidence, Labelling, Documentation – Photography, Videography and Sketching. Digital Imaging of Crime Scene, 3D scanning technique.

Unit II- Evidence Collection Kits

Importance of evidence collection kit and types of kits - General Crime Scene Kit, Fingerprints Kits - Forensic Light Source Kit, Foot & Tireprints casting Kit, Blood Detection Kit, Semen Detection Kit, Explosives Kit, GSR Kit, Narcotics Kit, Sexual Assault Forensic Evidence Collection (SAFE) Kit, Arson Investigation Kit, Digital Evidence Collection Kit.

Unit III- Collection of Physical Evidence

Physical Evidence – Definition, types, HLP of Various evidence such as Biological – Blood, Semen, Saliva, Urine, Faecal Matter, Vomit, Vaginal fluid, Nasal & Buccal Swabs, Nails, Hair etc. Chemical – GSR residue, Explosive substance, Arson residues, Drug substance, Beverages, Petroleum samples, Toxins and Toxicants etc. Physical – Soil, Fiber, Glass fractures, Tool marks, Foot & Tire prints, Fingerprints, Weapons – firearms, knife, rod, hammers, etc. Digital – Storage devices – Floppy Disks, Hardisks, Pendrives, Memory Cards etc., Electronic gadgets – Laptop, Mobiles, Tabs,IoT Devices,etc.Preservation and Storage of evidence.

Unit IV- Crime Scene Reconstruction

Nature and importance of CSR – Basic principles and stages involved– Types and classification of reconstruction – Pattern evidence and shooting scene reconstruction – Manual and computer-assisted reconstruction of Bloodstain Pattern Analysis –Role of logic in CSR – Writing a reconstruction report – Correlation of crime scene analysis with behavioural analysis – Cases of special importance pertaining to forensic examination.National & International scenario of Crime Scene Management.

Reference Books:

1. A Forensic Guide for Crime Investigation – Standard Operating Procedures by LNJN National Institute of Criminology and Forensic Science
2. Criminalistics- An Introduction to Forensic Science 12th Edition by Richard Saferstein – Pearson
3. Forensic Science in Criminal Investigation & Trails by B.R. Sharma – Universal Law Publishing.
4. Techniques of Crime Scene Investigation by Barry A. J. Fisher & David R. Fisher – CRC Press
5. Introduction to Crime Scene Photography by Edward M. Robinson -Academic Press
6. Practical Crime Scene Processing and Investigation by Ross M. Gardner & Donna R. Krouskup – CRC Press
7. Crime Scene Management A Forensic Approach by Dr. M.S. Rao & Dr. B.P. Mathil – Selective & Scientific Books
8. Forensic Science, Its Related Issues, Techniques & Court Evidence by V.N. Sehgal - Selective & Scientific Books
9. Encyclopedia of Forensic Sciences Vol 1,2,3 by Jay A Siegel, Pekka J Saukko, Geoffrey C Knufer - Elsevier

M.Sc. Forensic Science
I Semester, Paper IV
MSFS104- Instrumentation

Aim and Objectives of Course: To inculcate knowledge on various analytical instruments used in Forensic Science.

Learning Outcomes

1. Principles, Mechanism, Procedures of Various Microscopes, Spectroscopic techniques, Separation techniques and Biochemical techniques.

Unit-I Microscopy

Introduction, principle and applications of Microscope, Compound Microscope, Stereomicroscope, Comparison Microscope,Polarized Light Microscopy, Fluorescence Microscopy, Transmission Electron Microscope, Scanning Electron Microscope – Energy Dispersive X-Ray, Atomic Force Microscope,etc.

Unit-II Spectroscopic techniques

Introduction to spectroscopy, Interaction of EMR with matter - absorption, emission, reflection, fluorescence, phosphorescence.
UV VisSpectrophotometry, AAS, AES, IR Spectroscopy, X-Ray Diffraction, XRF, EDXRF, Raman Spectroscopy, NMR, Mass Spectroscopy, ICP-MS, NAA.

Unit-III Separation Techniques

Introduction & principles of chromatographic Techniques – TLC, HPTLC,Column Chromatography, High Performance Liquid Chromatography, Gas Chromatography, Ion Exchange Chromatography, LC-MS, GC MS, Electrophoretic techniques,etc

Unit-IV Biochemical Techniques

Centrifugation, Immuno-Chemical Techniques, Immuno electrophoresis, Radio Immuno Assay (RIA), Enzyme linked Immuno Sorbent Assay (ELISA), FluoroscenceImmuno Assay,Flow Cytometry, PCR, etc.

Reference Books:

1. Encyclopedia of Forensic Sciences Vol 1,2,3 by Jay A Siegel, Pekka J Saukko, Geoffrey C Knufer - Elsevier
2. Practical Forensic Microscopy – A Laboratory Manual by Barbara P. Wheeler Lori J. Wilson – Wiley Blackwell
3. Principles of Instrumental Analysis by Skoog D.A., Holler J.F. and Neiman T.A. – Thomson 1997
4. Instrumental Methods of Analysis 7th Edition by Willard H.H. Merritt L.L. Jr. Dean J.A. and Settle F.A. – Wadsworth 1998
5. Instrumental Methods of Chemical Analysis by Chatwal, G.R. and Anand, S
6. Instrumental Methods of Chemical Analysis by Sharma B.K.
7. Immunology 5th Edition, by Goldsby R.A. Kindt, T.J. Osborne, B.A and Kuby, J – Freeman 2003
8. Harper's Biochemistry 25th Edition by Murray R.K. Granner D.K. Mayes P.A. and Rodsell, V.W.

I SEMESTER PRACTICALS

MSFS 105 – Crime Scene Processing Lab

1. Investigation-Scene of Crime.
2. Crime Scene Search methods and Numbering of Physical Evidence.
3. Crime Scene Sketching (Rough & Fine) by Baseline, Rectangular, Triangulation, polar techniques.
4. Crime Scene Photography – Close, Mid & Wide Range.
5. Handling,Lifting and Packing of physical evidence.
6. Sealing, Labelling and Preservation of physical evidences.
7. Crime Scene Reconstruction - Blood Pattern Analysis
8. Demonstration of Evidence Collection Kits – Crime scene kit, Fingerprints kit, Foot/Tire Print Casting kit, Forensic Light kit, etc.
9. Polygraphy / Lie Detection / Psychology evaluation.

MSFS 106 – Instrumentation Lab

1. Compound Microscope - Examination of RBC & Human Hair and Animal hair.
2. Stereomicroscope examinations of Pollen grains
3. Comparison Microscope – Toolmarks examination, Hairs, Bullets, Cartridges, etc.
4. TLC Ink, Pesticides and Black powder, etc.
5. Examination of Pesticides in UV Vis Spectrophotometer
6. Demonstration of Gas Chromatography & High-Performance Liquid Chromatography

Note:

i. Crime Scene visit along with police
ii. Visit to Forensic Science Laboratories
iii. Visit to IICT, LaCONES, NIN, etc.
iv. Visit to Court during trials

M.Sc. Forensic Science

II Semester, Paper I

MSFS201- Forensic Medicine and Anthropology

Aim and Objectives of Course: To impart knowledge on cause and time since death, sexual offences and role of anthropology, odontology and entomology in Investigation.

Learning Outcomes

1. To understand basics of Human Anatomy and Anthropology.
2. To learn postmortem examination procedure and its significance.
3. To learn various sexual offences and their forensic significance.

Unit – I : Forensic Medicine

Introduction to Forensic Medicine – Definition, History, and Development.Pathology, Medical Jurisprudence, Medical evidences- documentations, investigation of scene of death - Medical Law and Ethics.Introduction, History & Development of Forensic Anthropology & Archaeology, &F.Taphonomy. Role of Anthropologist at the Scene of Crime, Anthropologist , Equipment opted for search and recovery.

Unit – II : Human Anatomy

Introduction to Human anatomy and Physiology- Axial Skeleton- Skull, Sutures of skull, Cranial bones, Facial bones, Sternum, thoracic bones, vertebral column, Appendicular Skeleton Bones of Upper limbs, Lower limbs, Pelvic Girdle etc.

Determination of sex- from skull, mandible, and pelvis, Femur, scapula etc., Determination of Age- Suture closures, and growth of teeth & appearance of ossification centres. Determination of Stature, Difference between human and animal bones commonly confused with human bones. Facial Reconstruction& Superimposition.

Unit – III :Medico-legal Autopsy

Medico-legal Autopsy- Death and its Causes- External and internal examination of deceased body, Exhumation process and its importance. Determination of time since death and cause of death- Injuries - classification- Medico-legal aspects of injuries- Post-mortem changes- collection of post-mortem samples and preservation.

Introduction and Importance of Forensic Entomology-types & developmental stages.

Unit – IV :Odontology

Development of teeth- Dentition, Architecture of teeth, growth of teeth- Milk, Permanent. Forensic Odontology- Basic principles, Applications in criminal investigations- Bite mark Analysis, Age estimation etc. Dentition Library, Forensic Odontology limitations.Sexual offences- rape- unnatural sexual offences- sexual perversions- Abortion- Infanticide foeticides- impotence and sterility- virginity, Pregnancy and Delivery linked crimes- medico-legal crimes- thermal deaths- electrocution- starvation- anaesthetic & operative deaths- Mechanical Asphyxia- accidental- Drowning deaths- Poisoning deaths – Lightning

Reference Books:

1. Modi's Textbook of Medical Jurisprudence and toxicology – Edited By BV Subramanyam
2. Parikh's Textbook of Medical Jurisprudence , Forensic Medicine and Toxicology .
3. Principle of Forensic Medicine and Toxicology by Rajesh Bardale.
4. Review of Forensic Medicine and Toxicology by Gautam Biswas.
5. Fundamental Toxicology by John H. Duffus, Howard G. J. Worth.
6. Dr. Umadethan Principles and Practice of Forensic Medicine .
7. K.S.N Reddy , O.P Murty The Essentials of Forensic Medicine and Toxicology.
8. Angi M. Christensen , Nicholas v. Passalacqua , Eric j . Bartelink Forensic Anthropology current methods and practice.
9. Jason H. Byrd & James L. Castner Forensic Entomology .

M.Sc. Forensic Science

II Semester, Paper II

MSFS202- Forensic Physics and Ballistics

Aim and Objectives of Course: To impart knowledge on firearms, ammunition, ballistics and forensic engineering.

Learning Outcomes

1. Importance of firearms in shooting cases and their investigation.
2. Classification, parts and functions of firearms and ammunition.
3. To learn concepts relevant to forensic engineering.

Unit – I : Firearms & Ammunition

History & importance of Firearms – characteristics &classification. Functional assembly& workingPrinciple of firearms: Standard- Rifled, Small arms, Shot guns and Non-standard- Improvised, Country made, Imitative firearms. Differences between Company & Country made Firearms.

Ammunition -Introduction, Definition, Classifications–Metals used in Cartridge cases, types of bullets,Composition of different primers &propellants. Safety guidelines for handling firearms and ammunition.

Unit – II : Types of Ballistics

Introduction &Types of ballistics – Internal, External, Terminal& Firearm injuries

Internal Ballistics: –Definition, Ignition of the propellant, Manner of burning, Piobett's law, Shape and Size of the Propellant, pressure space curve, shot start pressure. All burnt point, Velocity, Space curve, Le Due's formula, muzzle velocity, Factors affecting muzzle velocity, Theory of recoil.

External Ballistics: Definition-trajectory drop in the flight of the projectiles force of gravity, air resistance-base drag, Yaw, Shape of Bullet (Spherical ball, Cylindrical-conical, flat nose, round nose, etc.), effective range, extreme range.

Terminal ballistics: Definition, behavior of various type of bullets on hitting the target, remaining velocity, stopping power, Tumbling of the bullet, Cavitation, Ricochet and its effects.

Firearm injuries: Ballistic aspect of firearm injuries, nature, Effect of target, Velocity, constructional features and range on the wounding, identification of firearm injuries, Evaluation of firearm injuries.

Unit – III : Identification Of Firearms & GSR

Identification of firearms& ammunition: Class characteristics & Individual characteristics. Different types of marks – firing pin marks, breech face marks, chamber marks, extractor marks, ejector marks. Bullet-number, direction of lands and grooves, striation marks, Indian Arms Act (IAA) – Report writing and court testimony.

Analysis of GSR – Composition of GSR, Location & Collection methods – Dry & Wet, Chemical & Instrumental techniques involved in analysis, Shooter Identification technique. Introduction to BDAS& IBIS. Test Firing

Unit – IV : Forensic Engineering &Toolmarks

Forensic Engineering: Vehicle accident investigation – Road Safety norms. Forensics of Building Failure, Bridge failure and civil engineering material failure - Cement and its composition – Reinforced Cement Concrete – Bitumen and road tar.. Examination of soil, Glass , paint, and electrical appliance.

Introduction to Toolmarks, Types, Class and individual characteristics.Embossment on metals surfaces and their erasure / obliteration – Restoration techniques - Chemical etching.

Reference Books:

1. J. Howard Mathews ; Charles C . Thomas Identification ,Vols 1,2 , &3; Springfiels, Illinois;
2. Hater , Jury And Weller , Firearms Investigation , Identification and Evidence ; Stackpole Books , Harrisburg , P A.
3. Vincent Di Maio , Gunshot Wounds; Cre Press , Washington , DC.
4. Brain j. Heard ; Hand Book Of Firearms and Ballistics ; John Willey , England.
5. TA ,Warlow ; Firearms, The Law And Forensic Ballistics ; Taylor And Francis , London.
6. Karl G. Sellieret.al ; Wound Ballistics And The Scientific Background ; Elsevier , London .
7. Garg J.ordog , Management Of Gunshot Wounds , Elesvier , New York.
8. L.vHogg ; The cartridges Guide – a small arms ammunition identification manual ; The stackpole co., Harrisburg P A

M.Sc. Forensic Science
II Semester, Paper III
MSFS203- Cyber Forensics

Aim and Objectives of Course: To create awareness on cyber-crimes and applications of forensic tools in investigation. To impart knowledge in fundamentals of computers, networks, cybersecurity and basics of python.

Learning Outcomes

1. Types of Cyber-crime and Cyber Attacks.
2. Fundamentals of Computer components and Networking & Security.
3. Applications of Computer Forensic tools in Investigation.

Unit – I: Cyber Crimes

Principles and Concepts of Cyber Crimes – Crime, Tort, Misdemeanor, Cyber Space, Cyber Crimes - unauthorized access and hacking, virus, worms & Trojan attacks, E-mail related crimes, Internet relay, chat relating crimes, sale of illegal articles, online gambling, phishing, Intellectual property crimes, web defacement, DOS attack, cyber stalking etc, Cyber Criminology, Information Security – Data Privacy, Penetration testing, Incidence Response, Conventional Crimes versus Cyber Crimes. Cyber Jurisdiction. Introduction to IT Act 2000, Indian IT Act 2008 and amendments

Unit – II : Computer Hardware &Networking

Computer Hardware Basics – Basics of Motherboard, Processors, System memory, RAM & ROM, System Storage Devices – types of harddisks – FAT, NTFS, RAID etc. Optical Drives, removable storage devices, tape drive, backup systems. Computer ports. Monitors and their types. Printers and their types. Functions of OS. Basics of Files and Directories, Computer principles and a backbox model of PC.

Fundamentals of Networking – Network Infrastructure, Principles of Network security.

OSI, TCP/IP, IP, Addressing, CIDR, DHCP, IPv6, ARP, ICMP, VPN, VLAN, DNS, RIP, Wireless, IEEE 802.11, Bluetooth, SIP, VoIP, CTI, ATM: Addressing Signalling and Routing – Header Structure – ATM Adaption layer – Management control. Internetworking with ATM: LAN – IP over ATM – Multiprotocol over ATM – Frame Relay over ATM. Routers, Switches, Hubs.

Unit – III :Object Oriented Programming using Python

The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iterations.

Functions, Scoping and Abstraction, Specifications, Recursion, Global variables, Modules, Files, System Functions and Parameters.

Classes and Object-Oriented Programming, Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding.

Unit – IV : Computer Forensic Tools and Technology

Introduction & their applications of various tools such as Packet tracer, Nmap, Zenmap, Snort IDS, Kali Linux – Tools and Commands, Hexworkshop, Exterro FTK, Oxygen Forensic Detective etc. Cellebrite UFED, Pro Discover, Encase ,Belkasoft Evidence Extractor, Port SwiggerBurpsuite, Autopsy.

Introduction to Forensic Audio and Video Analysis.

Reference Books:

1. Cyber Security (with CD): Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole, SunitBelapure.
2. Cyber Laws & Information Technology by Dr. Jyoti Rattan.
3. The Information Technology Act, 2000 [2021 Edn]- Bare Act with short notesby UNIVERSAL'S BARE ACTS
4. Cyber Crimes & laws by Taxman and Technology decoded by N.S.Nappani.
5. Computer Fundamentals, by ANITA GOEL, PEARSON.
6. Operating Systems: Three Easy Pieces by Remzi H Arpaci-Dusseau, Andrea C Arpaci-Dusseau
7. Operating System Conceptsby peter Abraham Silberschatz, Galvin, Gagne
8. Computer Networks by Andrew S. Tanenbaum, PEARSON.
9. Computer Networking: A Top-Down Approach, by Ross Keith W. And Kurose James F.
10. Linux Command Line and Shell Scripting Bibleby Richard Blum and Christine Bresnahan
11. Python Object-Oriented Programming - Fourth Edition by Steven F. Lott, Dusty Phillips, Packt Publication.

M.Sc. Forensic Science
II Semester, Paper IV
MSFS204- Psychology

Aim and Objectives of Course: Fundamentals of Psychology and its forensic applications.

Learning Outcomes

1. Development of psychology in various stages of human life.
2. Understanding Applications of psychology in interrogative procedures.
3. Significance of mental disorders in Forensic Psychiatry.

Unit I: Introduction to Psychology

Historical origin of psychology as a science & Development of Psychology in India – Emotion, Motivation and Personality. Psychology of Lifespan development – Definition, beginning of life, development in infancy, early childhood, middle childhood, young adulthood, middle adulthood and late adulthood.

Unit II: Physiological Psychology

Introduction, Organization of nervous system – Peripheral, Spinal cord and Brain, hormones and behaviour – Major endocrine glands and their functions, Hormones of stress, growth, sexual behaviour and reproduction. Physiological basis of Perception, Emotions, Learning and Amygdala.

Unit III: Types of Psychology

Social Psychology – Definition, History, Research methods. Counselling Psychology – Definition, Nature, Rules, Goals and Functions. Health and Clinical Psychology – Hypnosis, The Mind and Body relationship, Ethical Issues. Psychological Assessment – Nature, Components, significance.

Unit IV: Interrogative techniques and Forensic Psychiatry

Polygraph (Lie detection) – Objectives, Stages of Examination, Admissibility. History, Principle, Procedure & Importance - Brain Fingerprinting/ Brain Mapping, Narco analysis, Brain Electrical Oscillation Signature Profiling (BEOS).NHRC Guidelines, Admissibility in Court. Forensic Psychiatry – Delirium, Delusion, Hallucination, Illusion, Impulse, Psychopath.

Reference Books:

1. Developmental Psychology: A lifespan approach by Hurlock EB. (1980) – Tata McGraw – Hill
2. Human Development by Papalia. D.E. & Olds S.W. (1992) - Tata McGraw – Hill
3. Child Development by Beck L – Pearson
4. Introduction to Physiological Psychology, 3rd Edition by Levinthal C.F. (1996) – Prentice Hall
5. Biopsychology, 6th Edition by Pinel J.P.J (2006) – Pearson Education
6. Physiological Psychology (1950) by Morgan T.C and Stella . E
7. Physiological Psychology (1978) by Schwartz M. - Prentice Hall
8. The Biology of the Behaviour and Mind by Bridgeman (1994) - Prentice Hall
9. Psychological Testing and Assessment – An Introduction to Tests and Measurement 9th Edition by Ronald Jay Cohen & Mark E. Swerdlik – McGraw Hill Education
10. Handbook of Forensic Psychology by Prof, (Dr.) VimalaVeeraraghavan - Selective & Scientific Books
11. Introduction to Forensic and Criminal Psychology 6th Edition by Dennis Howitt – Pearson
12. Encyclopedia of Forensic Sciences Vol 1,2,3 by Jay A Siegel, Pekka J Saukko, Geoffrey C Knufer - Elsevier

II SEMESTER PRACTICALS

MSFS205 – Forensic, Medicine & Anthropology Lab

1. Preliminary & Confirmatory tests for Blood, Semen, Saliva, Urine etc.
2. Examination of Hair – Human & Animal
3. Microscopic Examination & Chemical analysis of Fibres – Cotton, Silk, Jute, Coir, Wool & Synthetic fibres.
4. Examination of Diatoms
5. Preliminary and Confirmatory test for Explosive anions – Nitrates, Nitrites, Thiosulphates, Thiocyanates, Chlorides, Chlorates, Perchlorates, Phosphates, Sulphates and Sulphites.
6. Examination of various documents under VSC.
7. Development of Fingerprints by Powder methods and lifting of FP
8. Development of Fingerprints by Iodine Fuming method
9. Collection of Plain & Rolled Fingerprints.
10. Collection and Preservation of Visceral Samples
11. Human Anatomy – Axial & Appendicular Skeleton.
12. Determination of Sex from skeletal remains
    - Pelvic Gridle, Skull
13. Estimation of stature by using long bones long bones.

MSFS206 – Forensic Physics & Cyber Lab

1. Preliminary tests for GSR.
2. Density gradient analysis of soil samples.
3. Restoration of erased identification marks
4. Determination of refractive index of glass.
5. Glass Fracture Analysis.
6. Casting of foot prints & tire prints.
7. Using Packet Tracer, perform the following:
   Basic Router/Switch Configurations, IPv4, IPv6 Routing Protocol Configurations, WAN Configurations, DHCP Configuration, Port Security Configuration, Access List Configurations, SNMP, VLAN Configurations
8. To identify different ports and other features using Nmap, Zenmap.
9. To perform terminal operations and various in-built tools in Kali Linux.
10. To extract and analyze data from HDD's and SSD's using different forensic tools and compare their hash values to determine the performance of the tools.
11. To crack passwords and decrypt data from encrypted and password protected mobile devices using different forensic tools.
12. How to configure Burp Suite and perform the following operations
    - Spider, Intruder, Repeater, Sequencer, Decoder, Scanner

Note: I. Autopsy Visit

II. Visit to Bell of Arms

M.Sc. Forensic Science

III Semester, Paper I

MSFS331-Handwriting & Signature Examination

Aim and Objectives of Course: To impart thorough knowledge on Handwriting & Signature and Study in various laws relevant to Documents.

Learning Outcomes

1. Principles, Methods and Procedures related to Analysis of Handwriting & Signature.
2. Latest advancements in Handwriting & Signature analysis
3. Importance of Linguistics and Stylistics in authorship determination
4. Laws and Areas relevant to Documents Examination and Expert opinion.

Unit – 1:

Neuromuscular basis of Handwriting – Broadman's area, Brain function for hand motor control, Neuroanatomical Bases of Hand motor control, Frontal-subcortical Neural Circuits and Moto Function. Handwriting as motor program, Hierarchical Models of Handwriting Motor Control.

Handwriting – History & Basic Principles of Handwritting, Characteristics of Handwriting – line quality, abbreviations, alignment, arrangement, connections, initial strokes, pen lifts, pressure, punctuations rhythm, shading, size, slope, terminal strokes, speed, tremor Connecting strokes, beginning and ending strokes etc,. Collection of Standards. Factors influencing handwriting. Comparison of Handwriting. Natural Variations in Handwriting. Simon New Comb Theory of probability, Disguised writing

Unit – 2:

Signatures – Characteristics – Slant, Process of evolving signatures. Kinematics of Signature authentication. Collection of standards, Specimen & admi Signatures, Comparison of Questioned & Standard Signatures. Identification of initials and illiterate marks. Forgeries – history, types of forgeries and detection techniques. Examination of Rubber stamps, Seals and Mechanical impressions. Digital Signatures and their Importance. Signatures and Writings on Touch screens– characteristics and examination.

Unit – 3:

Forensic Linguistics – Different areas of linguistics, Stylistics – types of norms, Idiosyncrasies and Stylometry, Methodology, Identifying authorship, Inferring characteristics of Authors, Application of stylistics in Anonymous letters, Limitations & Applications of Linguistics in Document Examination. Basics of Script analysis – Indian Languages. Examination of Vernacular scripts, influence of native language on foreign language scripts.Report writing based on Forensic Linguistics. MATLAB significance in Document Examination.

Unit – 4:

Laws related to QDE – Sections of IPC – 34, 120B, 302, 304, 304A, 306, 324, 409, 415, 416, 417, 418, 419, 420, 463, 467, 468, 470, 471, 489 (A-E), Sections of IEA - 45, 47, 57, 3(1), 65, 65B (1) & (2), 73 & 114. Sections of IT Act – 3, 3A, 4, 5, 14, 15, 16, 41, 35, 36, 66 (A, B, C, D), 73, 78, 79A 80. Opinion/Report writing.Conduct of Expert Witness.Importance of no opinion.Methods of Testimony Presentation.Debonair of expert.Examination in Chief, Cross Examination questions on QDE and Limitations of QDE.Moot Courts, Daubert guidelines and court rules.

Reference Books

1. Cross Examination of handwriting Expert – B.Lal&R.Chandra

2. Forensic Science in Criminal Investigation in trials – B.R.Sharma

3. Scientific Examination of Documents Methods and techniques – David Ellen _ 3rded

4. Forensic Document examination: Fundamentals & Current Trends – Jane A.Lewis

5. The Problem of Proof – A.S.Osborn – Universal Law

6. Typewriting Identification ISQD – Thomas CC – Billy Prior Bates1971

7. Suspect Documents: Their Scientific Examination, Universal Law Publishers

8. Forensic Handwriting Identification Fundamental Concepts and Principles – Morris, Ron – Academic Press.

9.Morris R.N (2000) Forensic Handwriting Identification (fundamental concepts and principals),Academic press.

10.Mehta M.K (1970) .The identification of Handwriting and cross Examination of Experts ,N.M Tripathi , Allahabad.

11.Sulner H.F (1966).Disputed Documents ,Oceana publications Inc .New York.

12.Levinson J (2000).Questioned Documents ,Academic Press , Tokyo.

M.Sc. Forensic Science

III Semester, Paper II

MSFS332- Advanced Questioned Document Examination

Aim and Objectives of Course: To impart thorough knowledge on Questioned Documents Examination and Investigative techniques in solving documents involved offences.

Learning Outcomes

1. Laws and Areas relevant to Documents Examination.
2. Basic & Advanced tools and instruments used in Documents Examination.
3. Studying various problems associated with Documents and their detection.

Unit – 1:

Legal Definitions of Documents - Sec 3 IEA & 29 IPC. History of QDE. Scope of QDE. Offences related to QDE. Collection, Handling and Preservation of Documents from SoC. Types of Documents. Preliminary Examination of Documents. Questioned & Standard Documents. Types of Standards.Authenticity of the Document.

Introduction to Forensic Accounting and Relevance of QDE, Examination of Financial Documents.

Quality management in Document Laboratories, Safety Management in Document Lab, NABL Guidelines for accreditation of document labs.

Unit – 2:

Instruments in QDE – 10x Magnifiers, Lights source. Principle & Applications of various Instruments used in QDE – Video Spectral Comparator (VSC) – various models, Docucenter, Poliview, Electrostatic Detection Apparatus (ESDA), Digital Handheld Microscopes and Stereomicroscope. Chromatographic techniques for Ink Analysis. Laser Desorption Mass Spectrometry for Ink Examination. Applications of Photography in QDE – types of photography, Document imagery enhancement techniques – Enlargement, Sharpening, Contrast stretching, and stereoscopy, etc.

Unit – 3:

Paper Examination – composition, manufacturing process, types of papers and watermarks in paper. Paper examination – physical appearance, porosity, microscopic and colour examination by Herzberg staining and Graff-C Stain. Ink Examination – types of writing inks, ingredients of ink – vehicle, binder, colorants/dyes and additives, printing inks, and writing instruments. Ink taggants.

Printers – Printing techniques – relieved printing, intaglio printing, offset printing, fexography, engraving, gravure printing, thermography, lithography, screen Printing etc. Types of Printers - Dot matrix, Inkjet, Laser, Thermal etc., Characteristics and Examination of Printed documents. Photocopiers – types, characteristics & examination of Photocopied documents. Examination & Characteristics of Facsimile Documents. Fax machines there working , Examination of their printouts..

Features of Payment cards – Ink, Signature panel, Magnetic stripe, Optical variable device, Embossing etc.,

Unit – 4:

Examination of Alterations - Additions, Obliterations, Erasures, Overwriting etc. Examination of Indented writings and Burnt documents. Secret writings – history, miniature writing, encryption techniques and steganography. Methods of Identification for Sequence of Strokes, creases and folds.

Security printing – Holograms, UV Vis Print, Rainbow printing, Microprinting, Gullioche, etc., Examination of Security Documents – Travel Documents – International Civil Aviation's Organization guidelines for travel documents, Financial Documents, Property documents, Identity cards, Credit cards , Pass books, Education Documents etc., and Counterfeit Currency. Digital Documents – Encryption & Decryption techniques of Digital Documents. Investigation of encrypted documents. Digital documents file formats.

Reference Books

1. Cross Examination of handwriting Expert – B.Lal&R.Chandra

2. Forensic Science in Criminal Investigation in trials – B.R.Sharma

3. Scientific Examination of Documents Methods and techniques – David Ellen _ 3rded

4. Forensic Document examination: Fundamentals & Current Trends – Jane A.Lewis

5. The Problem of Proof – A.S.Osborn – Universal Law

6. Typewriting Identification ISQD – Thomas CC – Billy Prior Bates1971

7. Suspect Documents: Their Scientific Examination, Universal Law Publishers

8. Forensic Handwriting Identification Fundamental Concepts and Principles – Morris, Ron – Academic Press.

9.Hilton O.(1982) The Scientific Examination of Questioned,Elsaevier North Holland Inc.Newyork.

M.Sc. Forensic Science

III Semester, Paper III

MSFS333 – Introduction to Fingerprint Science

Aim and Objectives of Course: To impart thorough knowledge on Science of Fingerprints and their importance in Criminal Investigation.

Learning Outcomes

1. Development of ridge patterns on Human palm and foot soles.
2. Principles, Methods and Procedures related to Fingerprints Examination.
3. Recording of Fingerprint patterns in various conditions
4. Latest advancements in Automated Fingerprint collection, storage and further reference.

Unit – 1:

Definition of Dactyloscopy. History of Fingerprints. History, Development and Importance of Central Fingerprint Bureau (CFPB) and National Crime Records Bureau (NCRB). Principles of Fingerprints. Anatomy and Physiology of friction ridge skin. Structure of Friction skin. Scars, Injuries and disruption of friction ridge skin. Embryology – Limb development, Ridge formation, Pattern formation. Role of Genetics in Fingerprints. Developmental changes in Fingerprint patterns.

Unit – 2:

Types of Fingerprints. Types of Fingerprint patterns, Analysis of Various fingerprint patterns – Loops, Whorls, Arches, Ridge characteristics, Ridge counting, Ridge tracing, Palm prints and their significance. Identification and Classification of Fingerprints – Henrys Classification – Single digit and Ten Digit Classification. Computer Automation and Print Classification. Classification of Palm Prints. Fundamentals of Fingerprint Comparison. Definition of Poroscopy. Characteristics of pores – size, position and latent print formation of pores. Definition and Importance of Edgeoscopy and Ridgeoscopy.

Unit – 3:

Recording of Fingerprints, Palmprints and Footprints - Different Fingerprint Lifters & Casting of Plastic Fingerprints from various surfaces. Recording Post-mortem Friction Ridge skin – Decomposed, Macerated, Desiccated, Rehydrated and Charred. Fingerprint pattern scanning devices, principles and their applications.

Unit – 4:

Forensic Podiatry – Types of Footprint impressions, Gait Pattern Analysis, Casting of 3D Footprints – PoP and Dental Stone, Electrostatic Dust Lifting – Footprints. Photography of Footprint impressions. Comparison of Questioned and Standard footprints. Factors influencing footprints. Expert Opinion on Footprint Impressions.

Reference Books

1. Biometrics & Fingerprint Analysis – Mrs. Indira Sudha
2. Fingerprints Analysis & Understanding– Mark Hawthorne
3. Graphology & Fingerprinting – Gupta & Agarwal.
4. Fundamentals of Fingerprint Analysis- Hillary Moses Daluz
5. Saxena B.L (1963) Law and Techniques relating to Finger prints , Foot prints and Detection of forgery , central Law agency ,Allahabad(Ed.A.K. Singla)

M.Sc. Forensic Science

III Semester, Paper IV

MSFS334- Advanced Fingerprints Examination

Aim and Objectives of Course: To impart thorough knowledge on Development of Fingerprints and Footprints

Learning Outcomes

1. Principles, Methods and Procedures related to Development of Fingerprints.
2. Chemical composition of fingerprints and their counter chemical reagents to development latent patterns
3. Importance development of fingerprints by various methods.
4. Principles, Methods and Procedures related to 3D print casting.

Unit – 1:

Development of latent fingerprints from Porous & Non-Porous surface - Non-Destructive methods – Reflected Ultra Violet Imaging System (RUVIS), Alternative Light Source (ALS) and Fingerprints Photography – Principle, limitations and application. Destructive methods - Physical Development – types of powders chemical compositions. Lifting, Handling and Preservation of Developed Fingerprints. Basic Tools – Magnifiers, Ridge Counters, Comparators, and Light Source.

Unit – 2:

Chemistry of Fingerprints – Chemical Composition of Latent Fingerprint residue, Composition of Sweat, Contents of Sebum, Aging of Latentprint print residue. Chemical Methods for Fingerprints Development – Principle, Method, and Applications – Cyanoacrylate vapour, Iodine fuming, Ninhydrin and its variants, Silver nitrate reagents, Multi Metal Deposition methods (MMD), Small Particle Reagent (SPR), 1,8-Diazafluoren-9-one (DFO), 1,2-Indanedione, 5-Methylthioninhydrin (5-MTN) Bleaching and Intensification etc.

Unit – 3:

Blood Prints Enhancement Techniques. Gun Blueing Reagents – Metal Deposition and etching. Applications of Sudan Black B. Silver physical development – Particle deposition, Water and Acid pre-treatment, Colloidal Gold Solution method, Modified Physical developer, Optical methods and Photo luminescent Development of FP. Fingerprint Detection by LASER and Spectroscopic methods.

Unit – 4:

Fingerprints in Biometrics – Fingerprint features, Image, Ridge density and width. Fingerprint Image Processing – Image estimation, Image filter, Thinning, Minutiae determination – Characteristics. Digital Fingerprints Matching. Automated Fingerprint Identification System (AFIS). Fingerprint Analysis and Criminal Tracing System (FACTS). Advantages of AFIS, NIST & WSQ standards. An Introduction to UID Aadhar and its significance. Importance of Touch DNA in Fingerprints.

Palm print Verification – Key Features – Lines & Texture, Datum Point Determination, Principal Lines Properties.

Reference Books

1. Biometrics & Fingerprint Analysis – Mrs. Indira Sudha
2. Fingerprints Analysis & Understanding– Mark Hawthorne
3. Graphology & Fingerprinting – Gupta & Agarwal.
4. Fundamentals of Fingerprint Analysis- Hillary Moses Daluz

SEMESTER – III PRACTICALS

MSFS335 – Questioned Documents Lab

1. Preliminary Examination of Questioned Documents
2. Collection, Handling and Preservation of Documents
3. TLC Analysis of various Ink
4. Examination of Printed Documents and photocopied documents.
5. Examination of Alterations - Additions, Obliterations, Erasures, Overwriting etc. by VSC
6. Deciphering Secret Writing – Various Methods
7. Examination of BankCheques, Educational Documents, Travel Documents, Passports, Identity Cards, Judicial &Non-Judicial Stamp Papers, etc. by VSC
8. Collection of Specimen Handwritings
9. Identification of various handwriting characteristics in questioned and standard handwritings
10. Comparison of Questioned and Standard Handwriting
11. Comparison of Questioned and Standard Signatures
12. Detection of Various types of Forgeries
13. Examination of Rubber Stamp Impression & other mechanical stamps

MSFS336 – Fingerprints Lab

1. Henry's classification of fingerprints
2. Identification of various fingerprint patterns – Loops, Whorls, Arches and their composites
3. Recording of Plain & Rolled Fingerprints
4. Ridge counting and training in various Fingerprint patterns.
5. Identification of Minutiae in Chance Fingerprints
6. Comparison of Fingerprints
7. Development of Latent Finger prints by Physical methods – Powder Methods
8. Development of Latent Finger prints by Chemical methods – Cyanoacrylate fuming, Iodine fuming, Ninhydrin, Silver Nitrate methods etc.
9. Lifting of developed Latent Fingerprints
10. Development Latent Fingerprints by RUVIS

M.Sc. Forensic Science

IV Semester

MSFS431 – Comprehensive Viva-voce

M.Sc. Forensic Science

IV Semester

MSFS432 – PROJECT

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
M.Sc. Forensic Science
I-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper I
MSFS101- Forensic Science & Criminal Justice

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Explain history and development of Forensic science on worldwide concepts.

   (OR)

   b) Explain in brief about DFSS, FPB, NCRB, and BPR&D.

2. a) Write about the school of criminology in detail.

   (OR)

   b) Explain about Differential Association theory and Self-control theory.

3. a) Explain about the hierarchy of Indian Police with their functions.

   (OR)

   b) Describe the Hierarchy of court and their role and duties.

4. a) Write what is meant by court testimony and why it's necessary.

   (OR)

   b) Explain about report writing and evidence evaluation.

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Write a note on: i) CID ii) NIA iii) RAW
   b. Write duties of Forensic Scientist.
   c. Explain about social change and crime relationships.
   d. Write about Probation and Parole.
   e. What are the powers of Lokayukta?
   f. Write about IPC and Sec 171B, 291, and 299 with suitable examples
   g. What is meant by the admissibility of expert testimony?
   h. Explain examination- in chief, cross-examination, and re-examination.

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I-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper II
MSFS102- Forensic Science & Divisions

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Explain Preliminary and Confirmatory tests for Blood, Semen, Saliva, Urine.

(OR)

b) what is Forensic Botany, Wood, leaves, seeds, Pollen grains& Starch grains.

2. a) Definition of Explosives and explain about Classification, Preliminary and Confirmatory tests for Explosive substances.

(OR)

b) Explain about Preliminary and Confirmatory tests for NDPS – Benzodiazepines.

3. a) Definition of Questioned Documents Explain about Alterations – Additions, Erasures, Overwriting, Obliterations. Secret writings.

(OR)

b) Definition of Fingerprints, Explain about Fingerprint patterns, Development techniques– Chemical and Physical.

4. a) Explain Wildlife Forensics, Wildlife Protection act. Schedules I to VI of WPA.

(OR)

b) Explain about Identification of teeth, claws, Ivory, Horns, antlers, furs, skin, bite.

Section-B **5X3=15**

5. Answer any FIVE of the following

a. Examination of Hair and Fibre.
b. Write Morphological and anatomical characteristics of Cannabis, Coca plants.
c. Explain Functions of Forensic Chemistry and Chemistry of Fire.
d. Examination of Petroleum products like Petrol, Diesel, and Kerosene.
e. What is VSC, ESDA.
f. Explain about AFIS.
g. Write about the Wildlife Protection act. Schedules I to VI.
h. Explain about Determination of the time of death and sex determination from bones.

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I-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper III
MSFS103- Crime Scene Management

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Define crime and crime scene, its importance and types of crime scene with suitable example.

   (OR)

   b) Explain about digital imaging of crime scene.

2. a) Explain about Fingerprint kit, Explosives kit, and GSR kit.

   (OR)

   b) Explain about Narcotics Kit, Sexual Assault Forensic Evidence Collection Kit

3. a) Describe in detail procedure of collection and packaging of faecal matter, Saliva, Semen, Vomit and GSR residue.

   (OR)

   b) How to collect and store Digital devices.

4. a) Explain about nature and importance of Crime scene reconstruction.

   (OR)

   b) Explain about role of Bloodstain Pattern Analysis.

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Write a note on: i) Videography ii) Sketching iii) Photography
   b. Write note on 3D scanning technique.
   c. Explain Digital Evidence Collection Kit and Blood Detection Kit.
   d. Write Arson Investigation Kit.
   e. What are Petroleum samples and Toxins samples that mostly found in crime scene
   f. Write Basic principles and stages involved crime scene reconstruction.
   g. Write classification of reconstruction
   h. Explain shooting scene reconstruction.

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Theory Model Question Paper Pattern: Paper IV
MSFS104- Instrumentation

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Explain about Introduction, principle and applications of Compound Microscope, Stereomicroscope, Comparison Microscope.

(OR)

b) Explain Transmission Electron Microscope, Scanning Electron Microscope.

2. a) Introduction to spectroscopy, Interaction of EMR with matter - absorption, emission, reflection, fluorescence, phosphorescence.

(OR)

b) Explain UV Spectrophotometer, AAS, AES, and IR Spectroscopy.

3. a) Write about Introduction & principles of chromatographic Techniques like TLC, HPTLC, Column Chromatography.

(OR)

b) Explain High-Performance Liquid Chromatography, Gas Chromatography, Ion Exchange Chromatography.

4. a) Explain about Immuno-Chemical Techniques, Immuno electrophoresis, Radio Immuno Assay (RIA).

(OR)

b) Explain about Enzyme linked Immunosorbent Assay (ELISA), Fluorescence Immuno Assay.

Section-B **5X3=15**

5. Answer any FIVE of the following

a. Write about Energy Dispersive X-Ray.

b. Explain Atomic Force Microscope.

c. Explain about X-Ray Diffraction, XRF.

d. What is Raman Spectroscopy and Mass Spectroscopy?

e. Write about liquid chromatography-mass spectrometry.

f. Explain about gas chromatography –mass spectrometry.

g. Explain Flow Cytometry.

h. What is PCR.

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II-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper I
MSFS201- Forensic Medicine and Anthropology

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Write detail about documentation and investigation of scene of death.

   (OR)

   b) Define Forensic Anthropology and what are the differences between Anthropology and Archaeology.

2. a) Explain Axial and Appendicular skeleton.

   (OR)

   b) Explain Anatomy of pelvis and illustrate how you will identify sex with pelvis.

3. a) Explain in detail about post-mortem changes.

   (OR)

   b) Describe different types of Mechanical injuries.

4. a) Define rape. Describe in detail about various types of rape. Add a brief note on Incest and its types.

   (OR)

   b) Explain in detail about teeth eruption process.

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Define forensic pathology.
   b. Describe the types of abortions.
   c. Write a difference between Male & Female Pelvis.
   d. Differentiate between incised and stab wounds.
   e. Write about sutures of skull.
   f. Differentiate between temporary and permanent dentition.
   g. Write a note on mechanical asphyxia.
   h. Give a brief account on exhumation.

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II-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-II
MSFS202- Forensic Physics and Ballistics

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Write in detail the classification of fire arms.

(OR)

b) Explain Improvised, Country-made, Imitative firearms. Differences between Company & Country made Firearms

2. a) Define internal ballistics, Ignition of the propellant, Manner of burning, Piobett's law.

(OR)

b) Define Terminal ballistics, behaviour of various type of bullets on hitting the target.

3. a) Different types of marks – firing pin marks, breech face marks, chamber marks.

(OR)

b) Analysis of Composition of GSR, Location & Collection methods – Dry & Wet.

4. a) Examination of soil, Glass, paint, and electrical appliance.

(OR)

b) Restoration techniques - Chemical etching.

Section-B **5X3=15**

5. Answer any FIVE of the following

a. Explain Composition of different primers &propellants.
b. Write about Safety guidelines for handling firearms and ammunition.
c. How to identify firearm injuries.
d. Explain about GSR
e. Explain Introduction to BDAS& IBIS.
f. Write about Test Firing
g. Explain about Cement and its composition.
h. What is Reinforced Cement Concrete, Bitumen and road tar

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II-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-III
MSFS203- Cyber Forensics

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Describe Factors contributing to incident severity and prioritization.

   (OR)

   b) Describe types of cyber-attack and Explicate email & Browser attack.

2. a) Explain Cryptography and its techniques.

   (OR)

   b) Describe Factors contributing to incident severity and prioritization.

3. a) Explain incident summary report.

   (OR)

   b) Explain verification and quality control.

4. a) Explain Cryptography and its techniques.

   (OR)

   b) Explain threat and its classification.

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Describe types of malwares.
   b. Write a note on Data masking.
   c. Explain security issues associated with Identities
   d. Write a note on cross site scripting & eavesdropping.
   e. Define ransomware and its types.
   f. Define virus and its types.
   g. Write a note on stakeholders.
   h. Explain digital forensics workstation.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
M.Sc. Forensic Science
II-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-IV
MSFS204- Psychology

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) What are the various developmental stages observed in the childhood?

   (OR)

   b) Write in detail about the development of Psychology in India?

2. a) Briefly describe about the Physiological Psychology?

   (OR)

   b) Explain about the physiological basis of perception, learning and Amygdala?

3. a) What is social and clinical psychology? And its differences?

   (OR)

   b) What is psychological Assessment? Explain its nature and significance?

4. a) Explain the principle and procedure of Brain fingerprinting?

   (OR)

   b) What is BEOS? Explain in detail?

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. What is Forensic Psychiatry?
   b. What are the main objectives of Polygraph?
   c. Explain Hypnosis and its relationship with body?
   d. Define Counselling Psychology?
   e. Explain the organization of nervous system?
   f. Explain about Hormones and its effect on the sexual behaviour and reproduction?
   g. Define Psychology?
   h. What is Forensic Psychiatry?

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
M.Sc. Forensic Science
III-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-I
MSFS331- Handwriting and Signature Examination

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Write class and individual characteristics of handwriting.

(OR)

b) Write about Collection of Standards. Factors influencing handwriting?

2. a) Explain Signatures Characteristics, Forgeries – history, types of forgeries and detection techniques.

(OR)

b) Examination of Rubber stamps, Seals and Mechanical impressions. Digital Signatures and their Importance.

3. a) Importance of Linguistics in Document Examination. Examination of Vernacular scripts, influence of native language on foreign language scripts.

(OR)

b) Write about Laws related to QDE Sections of IPC – 34, 120B, 302, 304, 304A.

4. a) Explain the principle and procedure of Brain fingerprinting?

(OR)

b) What about Methods of Testimony Presentation, Debonair of expert, Examination in Chief, Cross Examination questions on QDE and Limitations of QDE.

Section-B **5X3=15**

5. Answer any FIVE of the following

a. Explain Simon New Comb Theory of probability, Disguised writing.
b. Write Hierarchical Models of Handwriting Motor Control.
c. Explain about Kinematics of Signature authentication
d. Explain about Signatures and Writings on Touch screens– characteristics and examination.
e. What is Report writing based on Forensic Linguistics
f. Write about MATLAB significance in Document Examination
g. Explain about Sections of IEA - 45, 47, 57.
h. Explain Sections of IT Act – 3, 3A, 4, 5, 14

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
M.Sc. Forensic Science
III-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-II
MSFS332- Advanced Questioned Document Examination

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Collection, Handling and Preservation of Documents from Soc, Types of Documents, Preliminary Examination of Documents.

   (OR)

   b) Define Forensic Accounting and how Relevance of QDE, Examination of Financial Documents.

2. a) Explain Video Spectral Comparator, Electrostatic Detection Apparatus (ESDA).

   (OR)

   b) Write about Chromatographic techniques for Ink Analysis, Laser Desorption Mass Spectrometry for Ink Examination.

3. a) Explain Paper Examination like composition, manufacturing process, types of papers and watermarks in paper

   (OR)

   b) Explain Ink Examination like types of writing inks and ingredients of ink like vehicle, binder, colorants/dyes and additives, printing inks.

4. a) Examination of Alterations like Additions, Obliterations, Erasures, Overwriting and Examination of Indented writings, burnt documents.

   (OR)

   b) Explain about International Civil Aviation's Organization guidelines for travel documents, Financial Documents.

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Explain Quality management in Document Laboratories.

   b. Write about Safety Management in Document Lab.

   c. Explain about Document imagery enhancement techniques like Enlargement, Sharpening, Contrast stretching, and stereoscopy.

   d. Explain about Chromatographic techniques for Ink Analysis.

   e. Write about characteristics & examination of Photocopied documents.

   f. Explain about Rainbow printing, Micro printing, Gullioche.

   g. Explain about Methods of Identification for Sequence of Strokes.

   h. Explain about Encryption & Decryption techniques of Digital Documents.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
M.Sc. Forensic Science
III-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-III
MSFS333- Introduction to Fingerprint Science

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Definition of Dactyloscopy. Explain about History of Fingerprints.

   (OR)

   b) Explain Anatomy and Physiology of friction ridge skin, Structure of Friction.

2. a) Write about Types of Fingerprints, Types of Fingerprint patterns

   (OR)

   b) Explain about Classification of Fingerprints – Henrys Classification

3. a) Explain Recording Post-mortem Friction Ridge skin like Decomposed

   (OR)

   b) What is Forensic Podiatry, and explain about Types of Footprint impressions.

4. a) Explain PoP and Dental Stone, Electrostatic Dust Lifting of Footprints.

   (OR)

   b) What is Forensic Podiatry, and explain about Types of Footprint impressions

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Explain Embryology -Limb development, Ridge formation
   b. Write about Role of Genetics in Fingerprints.
   c. Definition of Poroscopy. Characteristics of pores – size.
   d. Definition and Importance of Edgeoscopy and Ridgeoscopy.
   e. Explain Fingerprint pattern scanning devices.
   f. Explain about fingerprints principles and their applications.
   g. Explain Expert Opinion on Footprint Impressions.
   h. Write Comparison of Questioned and Standard footprints and Factors influencing footprints.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
M.Sc. Forensic Science
III-SEMESTER END EXAMINATION
Theory Model Question Paper Pattern: Paper-IV
MSFS334- Advanced Fingerprint Examination

Time: 3 hrs **Max. Marks: 75**

Answer all questions. Each question carries 15 marks. **4X15=60**

Section-A

1. a) Development of latent fingerprints from Porous & Non-Porous surface and Non-Destructive methods like RUVIS, Alternative Light Source (ALS).

(OR)

b) Explain Lifting, Handling and Preservation of Developed Fingerprints.

2. a) Explain about Chemistry of Fingerprints, Chemical Composition of Latent Fingerprint residue

(OR)

b) Explain Cyanoacrylate vapour, Iodine fuming, Ninhydrin and its variants, Silver nitrate reagents

3. a) Explain the Blood Prints Enhancement Techniques. Gun Blueing Reagents – Metal Deposition and etching.

(OR)

b) Silver physical development – Particle deposition, Water and Acid pre-treatment.

4. a) Fingerprints in Biometrics – Fingerprint features, Image, Ridge density and width.

(OR)

b) Automated Fingerprint Identification System (AFIS). Fingerprint Analysis and Criminal Tracing System (FACTS)

Section-B **5X3=15**

5. Answer any FIVE of the following

   a. Explain Preservation of Developed Fingerprints
   b. Write about Basic Tools – Magnifiers, Ridge Counters, Comparators, and Light Source.
   c. Explain 1,8-Diazafluoren-9- one (DFO).
   d. Explain 1,2-Indanedione, 5-Methylthioninhydrin (5-MTN).
   e. Explain Optical methods and Photo luminescent Development of FP.
   f. Write about Fingerprint Detection by LASER and Spectroscopic methods.
   g. Importance of Touch DNA in Fingerprints.
   h. Explain UID Aadhar and its significance.