

BHARTI VISHWAVIDYALAYA DURG (C.G)

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SCHEME OF EXAMINATION & SYLLABUS OF MASTER OF SCIENCE (FORENSIC SCIENCE)

**UNDER
FACULTY OF SCIENCE**

**Session: 2021-2022
(Approved by Board of Studies)**

EXAMINATION SCHEME
M. Sc. FORENSIC SCIENCE

M. Sc. examination will be conducted in four SEMESTER
SEMESTER– I (20 CREDIT)
THEORY (16 CREDIT)

PAPER CODE	SUBJECT	CREDITS	DURATION	THEORY MARKS	INTERNAL ASSESSMENT	TOTAL MARKS
MFS-101	Forensic science & Criminology	4	3 Hrs	70	30	100
MFS-102	Forensic techniques & Instrumentation	4	3 Hrs	70	30	100
MFS-103	Crime Scene Management	4	3 Hrs	70	30	100
MFS-104	Questioned Documents	4	3 Hrs	70	30	100

PRACTICAL (04 CREDIT)

PAPER CODE	SUBJECT	CREDITS	DURATION	PRACTICAL MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFSL-105	Crime scene search study Lab	2	8 Hrs	70	30	100
MFSL-106	Questioned document Lab	2	8 Hrs	70	30	100

SEMESTER-II (20 CREDIT)**THEORY (16 CREDIT)**

PAPER	COURSE	CREDITS	DURATION	THEORY MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFS-201	Instrumental analysis- Chemical & Physical	4	3 Hrs	70	30	100
MFS-202	Instrumental Analysis – Biological Methods	4	3 Hrs	70	30	100
MFS-203	Forensic Anthropology and Fingerprints	4	3 Hrs	70	30	100
MFS-204	Forensic Chemistry and Toxicology	4	3 Hrs	70	30	100

PRACTICAL (04 CREDIT)

PAPER	COURSE	CREDITS	DURATION	PRACTICAL MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFSL-205	Practical based on Forensic Anthropology and Finger prints Lab	2	8 Hrs	70	30	100
MFSL-206	Chemistry and toxicological analysis Lab	2	8 Hrs	70	30	100

SEMESTER–III (20 CREDITS)**THEORY (16 CREDITS)**

PAPER	COURSE	CREDITS	DURATION	THEORY MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFS-301	Computer Forensics and Digital investigations	4	3 Hrs	70	30	100
MFS-302	Forensic Ballistics and Physics	4	3 Hrs	70	30	100
MFS-303	Forensic Biology and Serology	4	3 Hrs	70	30	100
MFS-304	Forensic Medicine	4	3 Hrs	70	30	100

PRACTICAL (04 CREDIT)

PAPER	COURSE	CREDITS	DURATION	PRACTICAL MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFSL-305	Practical Based on Forensic Ballistics and Physics	2	8 Hrs	70	30	100
MFSL-306	Practical Based on Forensic Biology and Serology	2	8 Hrs	70	30	100

**SEMESTER-IV (20 CREDIT)
THEORY (16 CREDIT)**

PAPER	COURSE	CREDITS	DURATION	THEORY MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFS-401	Quality Management & Research Methodology	4	3 Hrs	70	30	100
MFS-402	Advanced Forensic Serology & Immunology	4	3 Hrs	70	30	100
MFS-403	Advanced Forensic Toxicology and Pharmacology	4	3 Hrs	70	30	100
	Elective Paper					
*MFS-404a	Drug of Abuse	4	3 Hrs	70	30	100
*MFS-404b	Advanced Forensic Physics	4	3 Hrs	70	30	100
*MFS-404c	Questioned Documents	4	3 Hrs	70	30	100
*MFS-404d	Advanced Forensic Ballistics	4	3 Hrs	70	30	100

PRACTICAL (04 CREDIT)

PAPER	COURSE	CREDITS	DURATION	PRACTICAL MARKS	TEACHER ASSESSMENT	TOTAL MARKS
MFSL-405	PROJECT WORK	2	-----	-----	-----	100
MFSL-406	SEMINAR or VIVA	2	-----	-----	-----	100

*Select any one subject from elective paper.

SCHEME FOR PRACTICAL EXAMINATION

EXPERIMENT	MARKS
Experiment	50
Viva-voce	20
Teacher Assessment	30
TOTAL MARKS	100

SEMESTER I
MFS-101
FORENSIC SCIENCE AND CRIMINOLOGY

Credits: 04

UNIT I: Forensic Science

Definition, Scope, History and Development, Basic Principles of Forensic Science.

UNIT II Forensic Science Laboratories

Organizational structure of Forensic Science Laboratories at State and Central level , FPB, NICFS, CDTS (Central Detective Training School), NCRB, Ethics in Forensic Science, Duties of Forensic Scientist, Laboratory management system and Importance of accreditation in forensic science laboratories.

UNIT III: Law

General idea to IPC, IEA, CrPC, and its relevant sections related to Forensic Science. Introduction to offences against person.

UNIT IV: Criminology

Definition & scope, crime & Criminal, Introduction to classification of Offences. Brief introduction to schools of Criminology; White Collor crime, Organized Crimes, Economic crimes, Cyber crimes, crime against children and Woman.

UNIT V: Police Science

Police Organizations at State and Central Level, Introduction to CBI, BPR&D. Interpole its Role and functions. Introduction to Punishment, theories and types.

Recommended Book

1. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
2. Lundquest & Curry: Forensic Science, Vol I to IV, 1963, Charls C. Thomas, Illinois, USA.
3. Saferstein: Forensic Science Handbook, Vol I, II & III, Prentice Hall Inc. USA.
4. Saferstein: Criminalistics, 1976, Prentice Hall Inc. USA.
5. Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York.
6. Lee & Gaensselen: Advances in Forensic Science (Vol.2) Instrumental Analysis.
7. Kleiner, Munay (2002): Handbook of Polygraph testing. Academic Press.
8. Hess, A.K. and Weiner, I.B. (1999) Handbook of Forensic Psychology 2nd Ed. John wiley & sons.
9. Bruce A. Arrigo (2000) Introduction to Forensic Psychology Academic Press, London
10. N. Gilbert; Criminal Investigation; Third edition, Macmillan Publishing Company, 1993.

MFS-102
FORENSIC TECHNIQUES AND INSTRUMENTATION

Credits: 04

UNIT I

Ballistic Fingerprinting: Basic concepts of Forensic Profiling, Geographic profiling, Automated Drug-Profiling System, Sound Spectrograph; Breathalyzer, Electrostatic detection device (EDD), Forensic Palynology,

UNIT II

Forensic Photography: Basic principles and techniques of Forensic photography, Video Superimposition technique.

UNIT III

Infrared Microscope: Forensic Microscopy, Scanning Electron Microscope (SEM), Differential Scanning Calorimeter (DSC), Differential Thermal Analyzer (DTA), Neutron Activation Analysis (NAA) Nuclear Magnetic Resonance spectroscopy, DNA Sequence Analyzer.

UNIT IV

DNA fingerprinting: Introduction of DNA, Nature, Sources of DNA, Extraction of DNA, Basics of DNA Profiling: Polymerase Chain reaction. (PCR), Restriction fragment length polymorphism (RFLP,) Short tandem repeat (STR), Forensic significance of DNA fingerprinting.

UNIT V

Introduction to forensic Psychology: Basic concepts of Forensic Psycholinguistic Profiling, Psychological profiling, Legal tests for insanity. Narco analysis, Brain mapping, Polygraph: Principle, technique, forensic significance

Recommended Books

1. Robert D. Keppel Katherine M. Brown and Kristen Welch Forensic Pattern Recognition, Prentice Hall
2. Richard Saferstein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
3. Thali, Michael J., Brogdon's Forensic Radiology ,CRC Press
4. Sanford L. Weiss, Forensic Photography: The Importance of Accuracy, Prentice Hall
5. Christopher D D ,Advanced Crime Scene Photography CRC
6. Brent E. Turvey ,Criminal Profiling, Fourth Edition: An Introduction to Behavioral Evidence Analysis
7. Murray Kleiner Handbook of Polygraph Testing. Academic Press.
8. Qazalbash Yawer Law of Lie Detectors – Narco Analysis, Polygraph analysis, Brain mapping, Brain Fingerprinting Universal Law Publishing Co. Pvt. Ltd
9. Sharma, B.R. Scientific Criminal investigation, Universal Law Publishing Co.
10. Eckert W.G. Introduction to Forensic Sciences , CRC, New York
11. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences ,Academic Publishers, London
12. Frederick P. Smith, Sotiris A. Athanaselis Handbook of forensic drug analysis Academic Press

MFS-103
CRIME SCENE MANAGEMENT

Credits: 04

Unit I

Introduction to Crime scene investigation: Definition and Types of Crime scene, Principles of Forensic science, Experts team Composition, Role of First responding officer,

Unit II

Physical Evidences: Physical Evidences. Introduction, Definition, Types and their collection, Preservation, packaging, transporting and forwarding, various techniques used for handling, Physical and trace evidences, Crime scene tool kits and equipments etc. Ethics in Crime Scene Investigation.

Unit III

Digital evidence: Introduction, Definition types and their collection, preservation, packaging, transporting, storage and forwarding, Methodological approach to processing the crime scene. Processing a crime scene, Searching the scene- Types of Searches, Zone Search: Ever Widening, Circle Strip Search, and Grid Search, Indoor searches and outdoor searches.

Unit IV

Crime Scene Documentation: Crime Scene Documentation Crime Scene Photography, Videography, sketching and mapping. chain of custody, interpreting a crime scene, Reconstruction of a crime scene.

Unit V

Crime scene management or crime scene investigation: Crime scene management or crime scene investigation in the cases of fire and Arson, Explosions, Burglary and Theft, Hit & run, Sexual offences, Death investigation. Use of Forensic light sources for detection of biological evidences at scene of crime scene, Presumptive test for identifying narcotic drugs, blood, semen, explosive and Gunshot residues etc. Computer graphics, Electronic Detectors NDMagnetic locators.

Recommended Books

1. Saferstein, Criminalistics: An Introduction to Forensic Science Prentice Hall INC, USA
2. James S.H. and Nordby, J.J. : Forensic Science- An introduction to scientific and Investigative Techniques, CRC Press USA.
3. Eckert W.G. Introduction to Forensic Sciences , CRC, New York
4. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London
5. Kirk ,P.L .Fire Investigations, John Wiley and Sons
6. Kirk, P.L.; Criminal Investigation, Inter science Publisher Inc New York.
7. Anita .Y. Wonder ; Bloodstain Pattern Elsevier, London
8. Barry, A.J. Fisher.; Techniques of Crime Scene Investigation, 6th Edition Ed, C.R.C Press NY(2003)
9. Nordby, J Deed Reckoning ; The Art of Forensic Detection, CRC Pre LLC(2000)

MFS-104
QUESTIONED DOCUMENTS

Credits: 04

UNIT I: Document

Nature and problems of Document examination, Classification of documents, Types of Forensic Documents; Collection, handling, preservation, marking and forwarding of documents to the laboratory; Writing instruments and their characteristics.

UNIT II: Hand writing

Principle of handwriting identification, Hand writing and its characteristics, Individual characteristics, Factors affecting hand writing, Samples for comparison and comparison of handwriting, Examination of Signature characteristics, Disguised, Indented and secrete writings, Anonymours letters.

UNIT III: Document examination

Alterations in Documents, Examination of Paper & Ink, Examination of typed documents, Examination of Seal, rubber & other mechanical impressions, Handling and examination of charred documents,

UNIT IV: Forgery

Forgery, Methods of Forgery, Examination of Forged currency notes.

UNIT V: Basic tools

Age determination of documents, Basic tools needed for Forensic document examination, Photography of documents, Principle and Forensic significance of Video Spectral comparator (VSC), Electrostatic detection apparatus (ESDA).

Recommended Books

1. Hilton; O. Scientific Examination of Questioned Documents,, Elsevier, NY
2. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
3. Wilson R. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi Indian
4. Hard less H.R; Disputed Documents, Handwriting and Thumbs – Print identification, profusely illustrated, Law Book, Allahabad
5. Morris Ron N. Forensic Handwriting Identification; AcadPress, London.
6. Roy A Huber, A.M. Headrick; Handwriting Identification- Facts and Fundamental, CRC Press
7. Laboratory working procedure manual, Documents DFS, New Delhi, 2005

MFSL-105
CRIME SCENE SEARCH STUDY LAB

Credits: 02

1. Evaluation of Crime scene and photographs
2. Searching of physical evidence at crime scene.
3. Collection of evidence with individual characteristics:
(1) Fingerprints (2) Tire tracks and foot impressions
4. Analysis of pattern –Blood stain pattern, Fire pattern
5. Lifting of prints and impressions by caste and replicas.
6. Sole prints comparison and their lifting from the scene of crime.
7. Collection, packing and preservation of biological evidences
8. Reconstruction of crime scene
9. Preparation of report of the examination.

Recommended Book

1. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
2. Lundquest & Curry: Forensic Science, Vol I to IV, 1963, Charls C. Thomas, Illinois, USA.
3. Saferstein: Forensic Science Handbook, Vol I, II & III, Prentice Hall Inc. USA.
4. Saferstein: Criminalistics, 1976, Prentice Hall Inc. USA.

MFSL-106
QUESTIONED DOCUMENTS LAB

Credits: 02

1. Examination of Erasures on Questioned document.
2. Examination of Obliteration on Questioned document.
3. Examination of Addition on Questioned document.
4. Decipher unknown Secret Writings.
5. Chromatographic comparison of different ink.
6. Comparison of Handwriting and Signatures.

Recommended Books

1. Hilton; O. Scientific Examination of Questioned Documents,, Elsevier, NY
2. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi

SEMESTER II
MFS-201
INSTRUMENTAL ANALYSIS – CHEMICAL AND PHYSICAL

Credits: 04

UNIT-I

Atomic Spectra: Basic concepts of Atomic spectra, Energy levels and Molecular spectra, Electromagnetic spectrum, Sources of radiation.

UNIT-II

UV-Visible spectroscopy: Basic concepts, Principles and Forensic applications of UV-visible spectroscopy, Infra Red (IR) spectroscopy, Fourier transform Infra Red (FTIR) spectrophotometer.

UNIT-III

Chromatography: General introduction to chromatography, Basic concepts, principles and functions of Thin Layer chromatography (TLC), High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC) and High performance Thin layer Chromatography (HPTLC).

UNIT-IV

Spectroscopy: Introduction to spectroscopy, Detector and its types.

UNIT -V

Spectrophotometry: General introduction, Basic concepts, Principles and Forensic application of Atomic Absorption Spectrophotometry (AAS), Atomic emission Spectrometry (AES), Inductive coupled plasma (ICP), X-ray spectroscopy, Auger emission spectroscopy, Mass spectrometry.

Recommended Books:

1. John C. Lindon, George E. Tranter & John L. Holmes; Encyclopedia of Spectroscopy & Spectrometry, Academic Press (2000)
2. Cottrell, C.T. Irish, D, Msters V M., and Steward, J.E. (1985) Introduction to ultraviolet and visible spectrophotometry, 2nd ed. Pye Unicam, Cambridge
3. Burgess, C., and Knowle, A. (1981) Technique in visible and Ultraviolet absorption spectroscopy, Chappman and Hall, London
4. Claridge, T. D. W., High-Resolution NMR Techniques in Organic Chemistry. A Practical Guide to Modern NMR for Chemists, OUP, Oxford, 2000

MFS-202
INSTRUMENTAL METHODS - BIOLOGICAL

Credits: 04

UNIT I

Microscopy: Basic principles of Microscopy, Comparison microscope, Stereoscopic microscope, Fluorescent Microscopy, Infrared .Microscopy.

UNIT II

Electron Microscope: Scanning Electron Microscope (SEM) & Transmission Electron Microscope (TEM)

UNIT III

Immuno chemical technique: General principles of Immuno chemical technique, Antigen-Antibdy bindning, Production of Antibodies, Precipitin reaction, Gel immuno diffusion, Immuno elctrophorsesis, Complement fixation, Radio Immuno assay, ELISA, Fluroscent immuno assay.

UNIT IV

Electrophoresis: Electrophoretic Technique, General principles, Factors affecting electrophoresis, High voltage electrophoresis, polyacrylamide gel electrophoresis, Isoelectric focusing (IEF), Isoelectrophoresis, Preparative, Horizontal and Vertical Electrophoresis

UNIT V

Molecular Biology Techniques: Genetic Manipulations, Gene cloning, DNA extraction, Polymerase chain reaction, DNA sequencing, Gene Libraries, Colony Hybridisation, Nick translation, Expression of Genes.

Recommended Books

1. Alan Gunn Essential forensic biology Jhon. Wiley
2. Barbara Wheeler Lori J. Wilson, Practical Forensic Microscopy: A Laboratory Manual.
3. Bryan L.William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975)
4. Keith Wilson & John Walker; Practical Biochemistry- Principles & Techniques, 5th Ed., Cambridge University Press
5. George M. Malacinski; Essentials of Molecular Biology, 4th Ed. Jones and Bartlet Pub. (2003).
6. Gardnes & Snustd; Principles of Genetics 6th Ed., John Wiley& Sons
7. D.M.Weir; Hand Book of Experimental Immunology, 2nd Ed., Blackwell Pub.
8. Ivan M.Roett; Essential Immunology, 6th Ed., Blackwell Pub.
9. .Working Procedure Manual Biology / Serology, DFS Pub New Delhi 2005

MFS-203

FORENSIC ANTHROPOLOGY AND FINGERPRINTS

Credits: 04

UNIT -I

Forensic Anthropology: Definition scope and Problems, Human skeleton, comparative skeletal anatomy of human and non-human. Bones- Identification, Classification and determination of Site, Morphological and Anatomical Characteristics, Determination of Age, Sex, Race and Stature determination from skeletal remains: skull, Pelvis, and other bones.

UNIT- II

Personal identification techniques: Introduction and forensic importance; Significance of somatoscopy, somatometry, osteometry and craniometry in Personal Identification; Portrait Parle/Bertillon system, Facial reconstruction, Super imposition technique.

UNIT- III

Forensic Odontology: Development and scope, It's role in mass disaster and anthropology, Types of teeth and their functions. Age determination from teeth: dental anomalies, Forensic significance of Bites marks: Photography, evaluation and legal significance of bite marks.

UNIT -IV

Fingerprint: History and development of finger prints, Structure of ridged skin, morphological plan of volar pads and configurational areas. Development of volar pads, ridges, Classification of finger Prints, pattern types, Henry system of classification (Primary to key classification), Searching of finger print evidence and composition of Sweat.

UNIT -V

Chance Finger Prints: Conventional methods of development of latent finger prints:. Biological methods of development of latent prints on skin; Systematic approach to latent print processing, preserving and lifting of finger prints; Photography of Finger Prints, comparison of finger prints .Automatic Finger Print Identification system (AFIS), Expert evidence.

Recommended Books

1. Steven N. Byers Introduction to Forensic Anthropology. Allyn & Bacon.
2. Karen Ramey Burns ,Forensic Anthropology Training Manual, The (2nd Edition) Prentice Hall
3. Debra Komar Jane Buikstra, Forensic Anthropology: Contemporary Theory and Practice , Oxford University Press, USA
4. M. Anne Katzenberg (Editor), Shelley R. Saunders, Biological Anthropology of the Human Skeleton, Wiley-Liss
5. Tim D. White , Michael T. Black, Pieter A. Folkens ,Human Osteology, Third Edition , Academic Press
6. D. Gentry Steele, Claud A. Bramblett, The Anatomy and Biology of the Human Skeleton ,Texas A&M University Press
7. Forensic Dentistry by Paul G. Stimson, Curtis A. Mertz; CRC Press, LLC, 1999.

MFS-204
FORENSIC CHEMISTRY AND TOXICOLOGY

Credits: 04

UNIT I

Forensic chemistry: Definition and scope, Introduction to Narcotic drugs, Depressants, stimulants, and Hallucinogens their Active components and method of analysis, Designer Drugs & Anabolic steroids,

UNIT II

Liquor: Analytical methods of analysis of IMFL, Country and Illicit liquor, Denatured spirits and their analysis.

UNIT III

Fire and Arson investigation- Methods of flammable oil residues detection from debris; Detection of adulteration in Petrol and Diesel, edible oils, Examination of chemicals used in trap cases, Analysis of metals in cheating cases, Explosives: Introduction, classification and various methods of analysis of Explosives.

UNIT IV

Forensic Toxicology: Definition and scope, Poisons–Definition and Classification. Methods of isolation of poison from Viscera, Collection and Preservation of Viscera and other relevant materials, Analysis of ethyl alcohol and methyl alcohol in biological fluids.

UNIT V

Extraction methods of poisons from viscera, blood and urine. Isolation and identification of Plant Poisons, opium and its derivatives, Benzodiazepine tranquilizers, Metallic Poison, Insecticides and Pesticides. Basic concepts of Poisonous Mushrooms, Poisonous fungi, Food Poisoning, Common vegetable abortifacients, Animal poison, Snake venom.

Recommended Books:

1. Khan, JaVed I., Ho, Mat H. Analytical Methods in Forensic Chemistry. New York: Working Procedure Manua Chemistry/Toxicology/Explosives/Narcotics, DFS Pub. New Delhi
2. Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
3. Saferstein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
4. Maudham.B.et.al; Vogel's Textbook of Quantitative Chemical. Analysis, Longman
5. John D. DeHaan ; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J
6. Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.
7. C.A. Watson; Official and standardized Methods of Analysis. Royal Society of Chemistry, UK.
8. Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
9. Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.
10. Curry A.S; Analytical Methods in Human Toxicology, Part II, CRC Press Ohio

MFSL-205
ANTHROPOLOGY AND FINGERPRINTS LAB

Credits: 02

1. Determination of sex from Skull Sutures & Pelvis
2. Determination of age from teeth & Skull
3. To perform osteometric measurements on long bones
4. To perform craniometric measurements on skull
5. To perform somatometric measurements on livings- Height vertex, Head length, Head breadth, Foot length, Foot breadth, Nasal height, Nasal breadth, External bi-orbital breadth, Internal bi-orbital breadth, Bigonial breadth and Bizygomatic breadth
6. To obtain Plain and rolled inked finger prints.
7. To identify the finger Print Patterns.
8. To perform ridge tracing and ridge counting.
9. To identify the ridge characteristics.
10. To develop latent finger Prints with powder methods.
11. To develop latent finger Prints with chemical methods.

Recommended Books

1. Steven N. Byers Introduction to Forensic Anthropology. Allyn & Bacon.
2. Karen Ramey Burns ,Forensic Anthropology Training Manual, The (2nd Edition) Prentice Hall

MFSL-206

CHEMISTRY AND TOXICOLOGICAL ANALYSIS LAB

Credits: 02

1. Determination of methanol and ethanol in liquor sample.
2. Analysis of narcotic drugs by TLC
3. Determination of Ethanol and Methanol in alcoholic liquors
4. Examination of inorganic acid in partially burnt clothe
5. Detection of adulterant in vegetable oil
6. Identification of opium/ dhatura alkaloids by TLC
7. Identification of poisonous seeds- Ricinus, Croton and Argemone.
8. Analysis of viscera(simulated sample) for Organo Chloro and Organo Phosphorous pesticides.

Recommended Books:

1. Khan, JaVed I., Ho, Mat H. Analytical Methods in Forensic Chemistry. New York: Working Procedure Manua Chemistry/Toxicology/Explosives/Narcotics, DFS Pub. New Delhi
2. Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer

SEMESTER III
MFS-301
COMPUTER FORENSICS AND DIGITAL INVESTIGATIONS

Credits: 04

UNIT -I

Basics of Computer: Introduction to computer, Operating System Windows/Unix: Operating system and operating environments DOS, Window 95 and 98, Windows NT, Windows 2000, Windows XP, Windows Vista, Windows 7 and Unix. Limitations of operating system, Networking, LAN, WAN, Internet and their forensic significance.

UNIT- II

Computer Crimes: Introduction; Classification; Difference between cyber and conventional crimes; Types of cyber crimes – Cyber stalking; Cyber pornography; forgery and fraud; Cyber terrorism; Spamming, Phishing, Privacy and National Security in Cyberspace, Cyber Defamation and hate speech, computer vandalism economic crimes, Internet or other telecommunication. Hacking, computer viruses and investigative techniques.

UNIT- III: Forensics Tools

Open Source versus Closed Source. Portable Devices & Mobile Phone Forensics, functioning of mobile phone and their operating. Search, Seizure, packaging and transporting of the digital evidence from the scene of crime. Use of Forensic Tool, FTK, Access data Forensic Tool Kit and preparation of the search of computer evidence to preparing courtroom testimony based upon the examination. Password Recovery Tools.

UNIT – IV: Advance practice in Digital Investigation

Advance practice in Digital Investigation, electronic format and representation in the court as per the Law suit. Fundamentals of current, domain administration; file system management; networked printers; user management; and workstation configuration.

UNIT – V: Linux Systems

Linux Systems, key components of the Linux/UNIX operating system. History of its evolution, selection criteria for Linux/UNIX as an alternative (or cooperative) operating environment in the business world.

Recommended Books:

- 1.Relevant sections of Information technology Act 2000.
- 2.Esharenana, Adoni, Frame works for ICT Policy Government, Social and Legal Issues.Information Science Reference, Harsey, New YORK.
- 3.Robert C. Newman, Computer Forensics: Evidence Collection and Management Auerbach Publications.
- 4.Eoghan Casey , Handbook of Computer Crime Investigation: Forensic Tools and Technology ,Academic Press
- 5.Clark, Franklin, and Diliberto, Ken, (1996). Investigating computer Crime, CRC Press, BocaRaton, Florida, USA

MFS-302
FORENSIC BALLISTICS AND PHYSICS

Credits: 04

UNIT- I

Ballistics: Introduction, History and Scope, Internal, External and Terminal Ballistics, Firearms, Definition and Classification, Characteristics and firing mechanism of smooth bored and Rifled firearms (Pistol, Revolver, and Rifles, etc), Classification, nomenclature and construction of country made firearms.

UNIT -II

Ammunition: Definition, classification and constructional features of different types of Cartridge, Types of primer & priming composition, propellant and their compositions, Bullets, Pellets and wads. Gun Shot Residues (GSR) analysis, Explosives: definition, types and classification of explosives, Arms and Explosives Act, Firearm injuries.

UNIT- III: Forensic Physics

Definition, area and scope, Types and Characteristics of Tool marks: Glass: Types of glass and their composition, Types and Identification of glass fractures, examination and its forensic significance.

UNIT- IV: Forensic analysis

Forensic analysis of Paint, Soil, Papers, Foot Prints and Tyre Impression, Principle & Technique of Restoration, Etching Reagents.

UNIT- V: Fibre

Fibers - Classification and Characteristics examination of fibers, Physical matches of broken objects.

Recommended Books

1. Working Procedure Manual Ballistics/Physics, DFS, New Delhi, 2005
2. Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, the University Book Agency, Allahabad.
3. Gunther & Gunther, 1935: The Identification of Firearms, Willies, New York.
4. Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.
5. Burrad, 1951: The Identification of Firearms and Forensic Ballistics.
6. Sharma, B.R.: Firearms in Criminal Investigation and Trails, 1990.
7. Dimado: Gunshot Wounds, 1987.
8. Kumar K: Forensic Ballistics in Criminal Justice, 1987
9. Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ.
10. B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN 0784 05749 (2001)

MFS-303
FORENSIC BIOLOGY AND SEROLOGY

Credits: 04

UNIT- I: Forensic biology and serology

Definition and scope of Forensic biology and serology, Collection and evaluation of biological evidences, Forensic significance of blood, semen Hair, Fibers and plant materials as evidence, Introduction and Scope of Microbial forensics, Diatoms- Types, morphology, methods of isolation and their Forensic importance, Identification of pollen grains and and its Forensic Importance.

UNIT- II: Blood

Composition and Histology, Identification of blood and blood stains, Examination of dried blood. Determination of species, Grouping of Blood stains and their techniques; ABO, Rh and MN system, Genetic markers and their classification.

UNIT- III: Examination of other body fluids/stains

Morphological structure of spermatozoa of human, confirmatory test for a spermic semen- p-30, Identification and examination of other body fluids/stains-vaginal, saliva, urine, pus, vomit, milk, sweat and tears etc.

UNIT –IV: DNA

Introduction, Source and Structure, DNA Profiling techniques, Forensic Significance of mt DNA and Y chromosome, DNA Polymorphism, PCR and RFLP methods of biological fluid analysis.

UNIT –V: Entomology

Identification methods of wild life materials and Entomological evidences.

Recommended Books

1. Robertson, J. (1996): Forensic Examination of Hair. Taylor and Francis, USA.
2. Modi, J.K.: Medical Jurisprudence and Toxicology, N.M. Tripathi Pvt. Ltd.
3. Fraser, Roberts J.A (1965): An introduction to Medical Genetics.
4. Chatterjee, C. C- (1975): Human Physiology.
5. Boorman, K. E: Blood Group Serology, Churchill, and Lincoln, P. J. (1988)
6. Race, R. R. and Sangar, R. Blood Groups in Man. Blackwell Scientific, Oxford.
7. Saferstein, R. (1982): Science Handbook, Vol. I, II and III, Prentice Hall,
8. Barris, H. and Hopkinson, D. A. (1976): Handbook of Enzyme, Electrophoresis, Elsevier, North, Holland, New York.
9. Gilblet, E. (1969): Marker's in Human Blood, Davis, Pennsylvania.
10. Culliford, B. E. (1971), the examination and Typing of Blood Stains, US Deptt of Justice, Washington.

MFS-304
FORENSIC MEDICINE

Credits: 04

Unit-I: Forensic Medicine

Definition, Scope and Importance, The Forensic Autopsy, Postmortem changes, Postmortem Hypostasis, Postmortem report, Role of Forensic Pathologist medico legal Expert in the investigation of death, collection and preservation of postmortem exhibits.

Unit II: Death

Definition, types, and nature Scene Investigation, Introduction to Sudden and unexpected Death, Infanticide, Thermal Deaths, Anesthetic and operative death, Death due to Drowning and Electrocution, Starvation and its types, Asphyxial Death, Time of Death-Time Indicators Bladder content, Stomach Content, Lividity, Cooling of body, Rigor Mortis,

Unit – III: Injuries

Definition and Nature, Age of injuries, Ante-mortem and Post mortem, Fatal injuries, Incapacitation .After effects of Fatal injuries.

Unit – IV: Trauma

Introduction to Trauma to the human body, Wounds Due to Blunt Trauma. Blunt Trauma Injuries of the Trunk and Extremities, Trauma to the Skull and Brain: Craniocerebral Injuries, Wounds Due to Pointed and Sharp, Edged. Classification -Abrasion, contusion, Bruise, Laceration, Punctured Incised, Gunshot.

Unit –V: Burns

Classification of burns Ante-mortem and Post mortem Burns, Cause of death, Scalding, Electrocution the Effects of Heat & Cold: Hyperthermia & Hypothermia, Deaths Due to Fire, Carbon Monoxide Poisoning.

Recommended Books

1. David Dolinak, Evan Matshes , Emma O. Lew .Forensic Pathology: Principles and Practice , Academic Press
2. Dominick DiMaio , Vincent J.M. DiMaio M.D.Forensic Pathology, Second Edition (Practical Aspects of Criminal & Forensic Investigations) CRC Press.
3. Matshes & Dolinak & Lew Forensic Pathology, Principles and Practice 1st Edition Academic Press
4. Jay Dix , Robert Calaluce, M Guide to Forensic Pathology,. CRC
5. Vincent J.M. DiMaio , Suzanna E. Dana Handbook of Forensic Pathology, Second Edition, CRC
6. Richard Shepherd. Simpson's Forensic Medicine, Hodder Arnold;
7. Payne-James, Jason (ed.; et al.) Encyclopedia of Forensic & Legal Medicine. Amsterdam; Boston: Elsevier Academic Press
8. Werner U. Spitz (Author, Editor), Daniel J. Spitz. Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation [Hardcover] Charles C Thomas Pub Ltd

MFSL-305
FORENSIC BALLISTICS AND PHYSICS LAB

Credits: 02

1. Identification of firearms, cartridges, bullets, gunpowder, etc.
2. Matching by comparison microscope bullets and cartridge cases.
3. Lifting or prints and impressions by caste and replicas.
4. Sole prints comparison and their lifting from the crime scene
5. Comparison of Tool Marks
6. Comparison of soil samples by Density gradient tube method.
7. Comparison of broken glass bangles.
8. Restoration of erased identification marks.
9. Physical matching of broken pieces of different objects.
10. Determination of density of glass fragments

Recommended Books

1. Working Procedure Manual Ballistics/Physics, DFS, New Delhi,2005
2. Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, the University Book Agency, Allahabad.
3. Gunther & Gunther, 1935: The Identification of Firearms, Willies, New York.
4. Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.

MFSL-306

FORENSIC BIOLOGICAL AND SEROLOGICAL ANALYSIS LAB

Credits: 02

1. Examination of blood stain (Screening and confirmatory)
2. To perform precipitin test for species of origin determination.
3. Examination of saliva.
4. Examination of seminal stage and microscopic examination of spermatozoa.
5. Examination and comparison of Human hairs.
6. Examination of hair of different animals as cat, dog, cow, horse and goat
7. To determine ABO blood grouping and Rh factor.
8. To prepare gel plates for electrophoresis.
9. Examination of diatoms.

Recommended Books

1. Robertson, J. (1996): Forensic Examination of Hair. Taylor and Francis, USA.
2. Modi, J.K.: Medical Jurisprudence and Toxicology, N.M. Tripathi Pvt. Ltd.
3. Fraser, Roberts J.A (1965): An introduction to Medical Genetics.
4. Chatterjee, C. C- (1975): Human Physiology.

SEMESTER IV
MFS-401
QUALITY MANAGEMENT AND RESEARCH METHODOLOGY

Credits: 04

UNIT- I: Elements of a Quality Management System

Elements of a Quality Management System: Quality, Total Quality, Quality assurance, Quality control Quality system. Quality Planning.

UNIT –II: Quality Audit

Internal and External Audit & MRM, History and development of ISO, Terminology of NABL. Benefits of ISO9000 series of standards, ISO9001 Requirements.

UNIT –III: Competence of testing and calibration laboratories

Essential requirements for the competence of testing and calibration laboratories Introduction, scope, management Requirements: Organizational, Documents control, Review of requests and Calibrations, Purchasing service and supplies, service to the clients, complaints, corrective and preventive action, control of records

UNIT –IV: Sampling

Sampling: sampling procedures (random and non random), sampling statistics, Physical state, homogenization, size and hazards in sampling, Significance of statistics in forensic science. Basic concepts of frequency distribution, measure of central values - Mean, median and mode, measures of dispersion, Range, Mean deviation and standard deviation, Correlation and Regression analysis. Probability- Definition, Theory, Classical and types.

UNIT- V: Research Problem

Meaning of research Problem: Research, definition, Objectives of research. Types of research-From the view point of application, Objectives, Inquiry mode. Search for existing literature, hypothesis, Interpretation and report writing.

Recommended Books:

1. ISO/IEC/17025:2005, NABL NABL -113, NABL -113A, 131, guidelines of NABL.
2. International Standard on General requirements for the competence of testing and calibration laboratories, 1st Ed., 1999-12-15, ISO/IEC 17025:1999(E). C.G.G.
3. Kothari, C.R. Research Methodology Methods and Techniques. Wiley Eastern Limited, New Delhi.
4. Saferstein R. Forensic Science Handbook I, II, III.
5. William L. Duncan: Total Quality, Key Terms and Concepts.
6. Murray S. Cooper: Quality control in the Pharmaceutical Industry.
7. John T. Rabbitt, Peter A Bergh: The ISO 9000 Book.
8. Willard Merritt, Dean & Settle: Instrumental Methods of Analysis.
9. Jami St. Clair Crime Laboratory Management: Academic Press.

MFS-402

ADVANCED FORENSIC SEROLOGY AND IMMUNOLOGY

Credits: 04

UNIT-I

Blood: Composition and functions, collection and species identification, Structure and function of serum proteins, Hemoglobin and its variants, Haptoglobins.

UNIT-II

Blood groups – history, biochemistry and genetics of ABO, Rh, Mn and other systems. Methods of ABO blood grouping (absorption-inhibition, mixed agglutination and absorption elution) from blood stains and other body fluids/stains viz. menstrual blood, semen, saliva, sweat, tear, pus, vomit, hair, bone, nail. Secretors and non-secretors. Blood groups that make racial distinctions.

UNIT-III

Analysis of Blood in Forensic Serology: Identification of blood, Chemical test for Blood identification, Species Origin determination in Blood Stains. **Blood Pattern Analysis:** History of Bloodstain Pattern interpretation, Properties of human blood, Size, Shape and Directionality of bloodstains, Spattered blood, other Bloodstain Patterns, Interpretation of Bloodstain on clothing and footwear.

UNIT-IV

Forensic Identification of Biological Fluids and Stains: Composition of Semen and morphology of spermatozoa, identification of Semen, Qualitative Assays of seminal fluids: Acid phosphatase, Microscopic identification of Spermatozoa, Oligospermia and Azoospermia. Identification of Azoospermic Semen stains, Prostate specific Antigen (PSA, P30) as an indicator of Semen. Saliva: Composition, Identification tests

UNIT-V

Immunology: Immune system, immune response, innate and acquired immunity and antigens, Immunoglobulin: Types, physio-chemical properties and function, Rising of antisera. Lectins: Forensic significance, buffers and serological reagents, methods of sterilization employed for serological work. Antigen-Antibody Reactions: Precipitation, agglutination, complement, neutralization, immunofluorescence.

Recommended Books

1. Working Procedure Manual Serology, DFS, New Delhi.
2. Danniell P. Stites, Abba I. Jerr, Tristram G. Parstow Medical immunology, Ninth edition; Prentice Hall International Inc. 1997.
3. Saferstein, R. (1982): Science Handbook, Vol. I, II, & III, Prentice Hall New Jersey.
4. Stern, C. (1964): Principles of Human Genetics, Freeman, California.
5. Berman, K.E.: Blood Group Serology, Churchill, and Lincoln, P.J. (1988)

MFS-403

ADVANCED FORENSIC TOXICOLOGY AND PHARMACOLOGY

Credits: 04

UNIT- I

Poisons: Definition, classification, types of poisoning, collection and preservation of toxicological exhibits in fatal and survival cases, mode of action and its effect on vital functions, specific analysis plan/ approach to toxicological examination of poisoning samples, significance and concept of forensic toxicological examination and law relating to poison.

UNIT – II

Extraction, Isolation/Separation and clean-up procedures of poisons and drugs: using conventional as well as modern techniques, Identification and estimation of following poisons from viscera, blood and urine, Barbiturates Benzodiazepines and its derivatives, Amphetamines. Insecticides/ Pesticides: Organochloro, organophosphorus and carbamates.

UNIT - III

Vegetable poisons: Nature, type, mode of action, extraction, isolation, Identification of the Poisonous seeds, fruits and roots.

UNIT –IV

Animal Poisons: Snake venom, composition, site of action, mode of action, effect on the body as a whole, and tests for identifications, Analysis of metallic poisons. Carbon monoxide poisoning: significance, signs and symptoms, methods of diagnosis, tests for identification.

UNIT –V

Forensic Pharmacological studies, Ingestion of drugs ,absorption, distribution, metabolism, pathwaysof drug metabolism, drug metabolism and drug toxicity, excretion of drugs and poisons, detection of poisons on the basis of their metabolic studies, interpretation of analytical data and forming of opinion. Spectrum of Toxic Effects, Dose and Response, Absorption, Distribution, Excretion and Influencing Factors; Dose – Response Relationship – Lethal dose 50, Effective dose 50

Recommended Books:

1. Curry, A.S.: Poison Detection in Human Organs, C. Thomas Springfield, Illinois USA,(1963).
2. Clark, E.G.C.: Isolation and identification Drugs, Vol. I and Vol.II, (1986)
3. Working Procedure Manual – Toxicology, DFS Publications (2005)
4. Sunshine, I: Guidelines for Analytical Toxicology Programme, Vol. I, CRC Press, (1950).
5. Michael J. Deverlanko etal: Hand Book of Toxicology CRC Press, USA (1995)
6. Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBSPub. New Delhi (1999)
7. Goutam,M.P. and Goutam ,S Analysis of Plant Poison,Selective & Scientific Books,NewDelhi

MFS-404a
ADVANCED FORENSIC CHEMISTRY

Credits: 04

UNIT –I: Analysis of beverages

Analysis of beverages: Alcoholic and non-alcoholic beverages, IMFL, country made liquor, licit and illicit liquors, Analysis of Proof spirit, Rectified spirit, denatured spirits, Special denatured spirit, Blood alcohol analysis by chemical methods; Significance of blood alcohol, Breath Screening devices

UNIT –II: Arson

Arson: chemistry of fire, pattern of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental method.

UNIT –III: Petroleum products

Examination of petroleum products: distillation and fractionation, standard methods of analysis of petroleum products like kerosene, petrol, diesel, lubricating oil, greases.

UNIT –IV: Drugs of abuse

Drugs of abuse: introduction, classification of drugs of abuse, drugs of abuse in sports, designer drugs and their forensic examination. Qualitative and quantitative analysis of Opium and opiates. Forensic examination of precursor chemicals and drugs under NDPS Act 1985

UNIT –V: Analysis of trace evidence

Analysis of trace evidence: cosmetics, dyes, paints, pigments, fibers, oils, fats, greases, soil and industrial dusts, chemicals; Analysis of corrosive chemicals- acids and alkalies; Chemistry and examination of detective dyes use in trap cases; Examination of cement and concrete, consumer item as gold, silver etc.

Recommended Books:

1. Clark, E.G.C.: Isolation and identification Drugs, Vol. I and Vol.II, (1986).
2. Vogel's Qualitative Inorganic Analysis (7th Edition) revised by G.Svehia (2nd Impression-2006).
3. Working Procedure Manual – Chemistry, DFS Publications (2005).
4. IS:3752; 1988 Indian Standard Alcoholic Drinks – Methods of Test, First Revision (1988)
5. IS:323-1959, Indian Standard Specification for rectified spirit, revised, 9th reprint, December (1989)
6. The ISI Specification for Kerosene (IS: 1459/1974)
7. The ISI Specification for Motor Gasoline (IS: 2796/2000)
8. The ISI Specification for Diesel (IS: 1460/2000)
9. The Indian Standard Methods of Test for Petroleum Products IS:1448

MFS-404b
DRUG OF ABUSE

Credits: 04

UNIT –I: Drugs of abuse

Introduction, Classification of drugs of abuse, Introduction to Narcotics of Natural Origin, Semi-Synthetic & Synthetic Narcotics, Stimulants Cannabis, Depressants, Hallucinogens and Inhalants, drug addiction and its problems.

UNIT –II: Narcotics Control Bureau

(NDPS Act) 1985 and its Amendments, Aim and objectives of Narcotics Control Bureau and Central Bureau of Narcotics.

UNIT –III: Analytical methods of testing

Active principles of narcotic drugs of natural origin, synthetic and semi-synthetic Narcotics by chemical and instrumental methods, Analysis of psychotropic substances e.g. psilocybin containing mushroom and peyote cactus, Analysis of rave drugs and sports drugs.

UNIT –IV: Herbal drug

Introduction, Taxonomy, Macroscopic and microscopic characteristics, Forensic analysis by presumptive tests, Colour tests, TLC , GC-FID, GC-MS and HPLC.

UNIT V: Designer Drugs

Introduction, Definition, Field and laboratory tests of Identification for Fentanyl Analogue, PCP Analogues, Amphetamine and Methamphetamine Analogue and Meperidine Analogue. Basic concepts of Drug abuse in sports.

Recommended Books:

1. Simon Wills ,Drugs of abuse ,Pharmaceutical Press, USA
2. A, Drugs of abuse. ,Practice Management Information Corp U. K
3. Lauri S. Friedman, Jennifer L. Skancke Athletes and Drug Use, Green haven Press, USA.
4. Paul K. Roberts Steroid Use and Abuse ,Nova Science Publishers ,USA
5. UNODC Recommended methods for the identification and analysis of cannabis and cannabis products Manual for use by National Drug Testing Laboratories United Nations office on drugs and crime, Vienna.
6. K. Valter , P. Arrizabalaga , J.C. Landry, Designer Drugs Directory. Elsevier Science, Switzerland.
7. Lawrence Clayton Designer Drugs Rosen Pub Group, New York
8. Lawrence Clayton, Tranquilizers, Enslow, Berkeley.
9. United Nations Drug Control Programme, Recommended Methods for Testing Lysergide (LSD).

MFS-404b
ADVANCED FORENSIC PHYSICS

Credits: 04

UNIT – I: Soil

Soil as evidence and challenges to forensic scientist, Composition and types of soil, Methods of examination of Preliminary discrimination methods and Density gradient tube technique.

UNIT- II: Glass

Types of glass and their composition, examination of glass fractures under different conditions, determination of direction of impact: cone- fracture, rib marks, hackle marks, backward fragmentation, colour and fluorescence, physical matching, density comparison, physical measurements, Refractive index by Refractometer, Elemental analysis, Interpretation of glass evidence.

UNIT- III: Tool marks

Types of tool marks: compression marks, striated marks, combination of compression and striated marks, repeated marks, class characteristics and individual characteristics, tracing and lifting of marks. Physical, chemical and instrumental methods of examination of strings/ropes, fibers, threads & fabrics, Wires/cables, seals, counterfeit coins, Physical match of broken objects. Restoration of erased/obliterated marks in different surfaces.

UNIT –IV: Forensic analysis of paint

Macroscopic & instrumental analysis like IR spectroscopy, Raman spectroscopy & X-ray diffraction, elemental analysis, Interpretation of Paint evidence.

UNIT- V: Speaker identification and tape authentication

Introduction to techniques of pattern recognition and comparison .Legal aspects. Principle and forensic application of Brain fingerprinting, Narco analysis and Lie detection.

Recommended Books

1. C.E.O Hara and J.W. Osterburg; An Introduction to Criminalistic, Indiana University Press, Blomington.
2. Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ
3. Working Procedure Manual : Physics DFS, New Delhi Publication (2000)
4. B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN
5. Goutam, S and Goutam, M.P.: Physical Evidences-Introduction & Bibliography on their Forensic Analysis. Shiv Shakti Book Traders, New Delh
6. James Michael Curran, Tachia Natilie Hicks and John S.Buckleton; Forensic Interpretation of Glass Evidence, CRC Press (2000)
7. David A. Crown; The Forensic Examination of Paints and Pigments, Tolyor & Francis,
8. Jay A.Siegel, Pekka J Saukko and Geoffrey C. Koouper; Encyclopedia of Forensic Science, Academic Press (2000).

MFS-404c
QUESTIONED DOCUMENTS

Credits: 04

UNIT – I: Questioned Document

Definition, Nature and History of document examination, Classification of Forensic documents- Admitted, Request and Typescript specimens, Holographic documents, Care and Handling of documents.

UNIT – II: Handwriting

Principle, General qualities, Writing habits, Individual Characteristics; Factors that causes changes in Handwriting, Systematic Examination of Handwriting; Examination of signatures, Characteristics of genuine and forged signatures; Alteration of Documents, Secret writings, Anonymus writing, Disguised writing, indented writings, Charred documents.

UNIT – III: Forgery

Various types of forgery and their examination, Determination of sequence of strokes; Age of Documents, Examination and Identification of Paper, Ink, Typescripts, seal, rubber, Carbon copies & other mechanical impressions, counterfeiting and examination of forged currency notes, Presentation of evidence in court.

UNIT –IV: Photography

Basic principles and techniques of Black & White and colour photography, Cameras and lenses, developments and printing, Different kinds of developers and fixers, Linkage of Cameras and Film negatives, Digital photography, digital water marking & digital imaging, Photogrammetry and videography, crime scene and laboratory photography IR, UV and Portrait photography, Recent developments in photography.

UNIT –V: Basic tools needed for Forensic Document Examination

Basic tools needed for Forensic Document Examination - Hand lens, Stereo microscope, Electrostatic detection device (EDD), Video Spectral Comparator (VSC)

Recommended Books:

1. Ordway Hilton; Scientific Examination of Questioned Documents, Elsevier, NY
2. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
3. Albert S Osborn; The Problem of Proof, 2nd Ed., Universal Law Pub. Delhi
4. Charles C. Thomas; I.S.Q.D. Identification System for Questioned Documents, willy Prior Bates Springfield, Illinois, USA
5. Wilson R. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi Indian Reprint
6. Goutam, Shubhra and Goutam M.P. Physical Evidences- Introduction and Bibliography on their forensic analysis, Shiv Shakti Book Traders, New Delhi.
7. Morris Ron N; Forensic Handwriting Identification, Acad .Press, London (2001)
8. Lerinson Jay; Questioned Documents, Acad Press, London
- 9.

MFS-404d
ADVANCED FORENSIC BALLISTICS

Credits: 04

UNIT- I

Firearms, Definition , History, classification and characteristics of firearms. Examination and identification of fire arms. Identification of origin, improvised/ country-made/ imitative firearms and their constructional features, Velocity and pressure characteristics under different conditions; various types of bullets and compositional aspects, latest trends in their manufacturing and design

UNIT- II

Internal Ballistics: Definition, ignition of propellants, shape and size of propellants, manner of burning, Piobett's law, pressure space curve, shot start pressure. various factors affecting the internal ballistics: All burn point, velocity, space curve Le Due's formula, muzzle velocity, factors affecting muzzle velocity ,theory of recall.

UNIT- III

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 the target, remaining velocity, stopping power, Ricochet.

UNIT- IV

Different types of marks produced during firing process on cartridge-firing pin marks, breech face marks, chamber marks, extractor and ejector marks and on bullet number/direction of lands and grooves, striation marks on the lands and grooves. Class and individual characteristics. Determination of range of fire-burring , scorching, blackening, tattooing and metal fouling, shots dispersion and GSR distribution, time of firing, different method employed, and their limitations Analysis of Gunshot Residues: Mechanism of formation of GSR.

UNIT -V

Firearm injuries: Evaluation of injuries caused due to shot-gun, rifle, handguns and country made firearms, methods of measurements of wound ballistics parameters, post-mortem and anti mortem firearm injuries; Report writing and expert's evidence.

Recommended Books:

- 1.Arms Act, 1959. And Arms Rule, 1962.
- 2.Working Procedure Manual: Ballistics, DFS New Delhi Publication,20005.
- 3.Bhattacharyya C.N., (2000) Particle Analysis for Detection of Gunshot Residues – A State-of-the-Art Technique, The Indian Police Journal, BPR&D, Vol.XLVII, No. 4, pp. 113-127
- 4.Burrad, G., (1951) The Identification of Firearm and Forensic Ballistics, Herbert, Jenkins, London.
- 5.Kumar, K., (1987) Forensic Ballistics in Criminal Justice, Eastern Book Co

**MFSL-405
PROJECT WORK**

Credits- 02

The Project work will be based on research facilities available in institutions or University.

MFSL-406
SEMINAR OR VIVA

Credits- 02

Seminar topics should be related to Project Work or Research oriented topics on recent trends in chemical sciences.

