Swami Vivekanand University, Sagar (M.P.)

As per model syllabus of U.G.C. New Delhi, drafted by Central Board of Studies and Approved by Higher Education and the Governor of M.P.

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Faculty of Science

Syllabus & Prescribed Book

Subject: Forensic Science

M.Sc. Semester Examination 2017-18

I to IV Semester

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Swami Vivekanand University, Sagar (M.P.)

COURSEWISE SCHEME

I[st] SEMESTER

1. Course Code	: MSCFSC	5. Total Practical	: 2
2. Course Name	:M.Sc. Forensic Science	6. Total Practical Marks	: 100
3. Total Theory Subject	: 4	7. Total Marks	: 300
4. Total Theory Marks	: 200	8. Minimum Passing Percentage	: 36

Sub. Code	Subject Name	Theory									Practical		Total	
		Paper					CCE		Total					
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Compulsory														
MSCFSC 101	Forensic Science And Criminal Justice System	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 102	Medical Jurisprudence	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 103	Questioned Documents, Finger prints and other impressions	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 104	Instrumental Method - Physical	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 105	**Practical-I** Crime scene investigation	0	0	0	0	0	0	0	0	0	50	18	50	18
MSCFSC 106	**Practical-II** Questioned Documents, finger prints and other impressions	0	0	0	0	0	0	0	0	0	50	18	50	18

Swami Vivekanand University, Sagar (M.P.)

Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**I Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**I**
Paper Title	**:**	**Forensic Science And Criminal Justice System**
Subject Code	**:**	**MSCFSC-101**
Marks	**:**	**50**

Unit — I

Forensic Science: Basic principles and its significance. History & development of Forensic science. Nature and scope of forensic science. Organizational structure of Forensic Science Laboratories at central & State level. Ethics in Forensic science.

Unit — II

Scene of crime: Types, protection of scene of crime, preservation (recording) of scene of crime- photography and sketching methods.

Physical evidence: Meaning, Types, search methods, collection and preservation, Forwarding. Chain of custody. Collection, preservation, packing and forwarding of: blood, semen and other biological stains, firearm exhibits, documents, fingerprint, viscera, hair & fiber, glass, soil and dust, petroleum products, drugs and poisons, etc.

Unit — III

Crime: Definition, theories of causation of crime: Pre-classical and Neo-classical, constitutional, geographical, economic, psychological, sociological, Multiple-causation approach.

General factors of crime, forms of punishment in brief.

Unit — IV

Indian Penal Code: Introduction, General exceptions, Offences against person, Offences against property, Attempt to suicide, Sexual offences.

Criminal Procedure Code: Introduction and general idea of sections: 291-93, 154, 155, 156, 157, 158, 159, 160, 161, 162, 172, 173, 174, 175, And 176.

Indian Evidence Act: Introduction and general idea of sections: 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, And 159.

Unit — V

Criminal Justice System: Police organization at district, state & central level. Organization of courts in India, jurisdiction of courts in criminal cases, prosecution, F.I.R., case diary, roznamacha.

Report Writing and Evidence Evaluation: Report formats of crime scene and laboratory findings.

Court Testimony: Admissibility of expert testimony, pro court preparation & court appearance, examination in chief & re-examination, cross examination.

Suggested Readings:

1. Saferstein: Criminalistics - An Introduction to Forensic Science, Prentice hall Inc. USA 91995).
2. C.G.G. Aitken and D.A. Stoney; The use of statistics in Forensic Science, Ellis Harwood Limited, England (1991).
3. James, S.H. and Nordby, J.J.; Forensic Science; an Introduction to Scientific and Investigative Techniques, CRC Press, USA (2003).
4. 0' Hara 86 Osterberg : An Introduction to Criminalistics.
5. Forest: Forensic Science, An Introduction.
6. Lee, Honry : Advances in Forensic Science.
7. Sharma J D: Vidhivigyan Avem Vish Vigya.
8. Sharma J D: Apradh ka Vigyanik Anveshan.
9. Sharma B R: Forensic Science in Criminal Investigation and trials.
10. Mordby, J Deed Reckoning - The Art of Forensic science Detection, CRC Press LLC, Boca Raton FL, CRC Press (2000).
11. Ram Ahuja : Criminology, Rewal Publ. jabalpur (2000).
12. Indian Penal Code.
13. Criminal Procedure Code.
14. Indian Evidence Act.

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**I Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**II**
Paper Title	**:**	**Medical Jurisprudence**
Subject Code	**:**	**MSCFSC-102**
Marks	**:**	**50**

Unit - I

Concept of Medical Jurisprudence: Brief knowledge about legal procedures in Courts, inquest, Criminal courts and their powers, Subpoena & oath of medical expert. Recording of Medical experts evidence in courts. Types of Medical evidence. Kinds of witness and rules for giving evidence.

Unit- II

Personal Identity: Definition and importance. Parameters contributing to personal identity-Race, Sex, Age, Complexion. features & Photographs, Anthropometry, Fingerprints, Footprints, Tattoo marks, Occupational marks, Handwriting, Clothes & Ornaments, Voice & Speech, DNA, Superimposition techniques for skull. Disputed paternity.

Unit — III

Post-Mortem Examination: Importance, post-mortem report format, external & internal examination in brief. Viscera & its preservation. Examination of decomposed and mutilated bodies. Precaution to be taken during post mortem examination. Exhumation. Cause of death.

Unit — IV

Wounds: Wounds & its types, Medico-legal aspects, post mortem & ante mortem wounds, General characteristics of injuries from burns, scalds, lightning, electricity and radiation. Forensic importance of wounds.

Unit — V

Deaths in its Medico-legal aspects: Modes of Death (Coma, Syncope, Asphyxia), Sudden death. Sign of Death, cessation of vital functions, changes in the Eye & Skin, cooling of body, post-mortem lividity, cadaveric changes in the muscles, putrefaction, adipocere & mummification. Estimation of time since Death.

Suggested Readings:

1. Modi JS: medical jurisprudence and Toxicology.
2. Taylor : Medical jurisprudence
3. Parikh CK: Chikitsa Nyaya Shastra Aur Vish Vigyan.
4. Keith Simpsen. & Bernard Knight : Forensic Medicine
5. Poison, CJ, DJ Gee, B. Knight : Forensic Medicine
6. Reddy : Forensic Medicine

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**I Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**III**
Paper Title	**:**	**Questioned Documents, Finger Prints And Impressions**
Subject Code	**:**	**MSCFSC-103**
Marks	**:**	**50**

Unit — I

Documents and Writing Instruments: Questioned document and their types. Instruments used to prepare documents, ink & its type, physical & chemical examination, paper & its type, manufacturing and examination of paper. Collection, handling, preservation and forwarding of documents seized from scene of crime.

Unit — II

Examination of Documents: Preliminary examination of documents, instruments required for examination. Handwriting- class & individual characteristics, basis of handwriting comparison, making of exemplar, variations in handwriting. Signature, Genuine & forged signatures and their examination. Digital signature.

Unit — III

Forged & Typed Documents: Alteration- Erasure, Addition, Obliteration and Sheet insertion. Secret writing & its decipherment. Charred documents & their decipherment. Indented writing.

Typewriting- Class and individual characters & their comparison. Printed matter and their examination.

Unit-IV

Finger Prints: History of finger print, formation of ridges, finger print patterns, ridge characteristics, ridge count, ridge tracing etc. Classification of finger print- primary, secondary, single digit, etc. Computerization of finger print and finger print bureau.

Unit - V

Examination of Finger Prints & Other Impressions: Types of fingerprint, latent, visible and plastic prints, location of finger print, development of latent prints by physical and chemical methods. Photography of finger prints. Foot and footwear prints, gait pattern,

casting of print on different surfaces and their comparison. Examination of tyre and skid mark on different surfaces and calculation of speed of vehicle. Forensic importance of lip print, bite mark and palm print.

Suggested Readings:

1. Rev. ED.; Ordway Hilton; Scientific Examination I Of Questioned Documents, Elsevier, New York; (1982)
2. Albert S. Osborn; Questioned Documents, Second Ed.; Universal Law Publishing, Delhi; (1998).
3. Albert S. Osborn; The Problem of Proot- Secon Ed.; Universal Law Publishing, Delhi; (1998).
4. Charles C. Thomas, Typewriting Identification I.S.Q.D.; Billy Bates; Springfield, Illinois, USA, (1971).
5. Charles C. Thomas, I.S.Q.D. Identification System for Questioned Documents; Billy Prior Bates Springfield, Illinois, USA, (1971).
6. Wilson R. Harrison; Suspect Documents - Their Scientific Examination; Universal Law Publishing, Delhi. (1997).
7. Hard less, H.R. : Disputed Documents, handwriting and thumbs - print identification : profusely illustrated, Low Book Co., Allahabad, (1988).
8. David R. Ashbaugh; Quantitative and Qualitative Friction ridge analysis, CRS Press, (1999).
9. Mehta M. K. ; Identification of Thumb Impression 86 Cross Examination of Fingcr Prints, N. M. Tripathi (P) Ltd, Bombay (1989).
10. Henry C. Lee 86 R. E. Ganesslen, Advances in Finger Print Technology, -RC Press, Boca Raton, London, (1991).

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**I Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**IV**
Paper Title	**:**	**Instrumental Methods- Physical**
Subject Code	**:**	**MSCFSC-104**
Marks	**:**	**50**

Unit — I

Basic Concept of Spectroscopy: General idea on spectroscopy, electromagnetic spectrum, various source of radiation their utility and limitation. Interaction of radiation with matter i.e., reflection, absorption, fluorescence etc. Detection of radiation i.e. photographic, photoelectric etc. Forensic application of spectroscopy.

Unit — II

Basic Concept of Atomic and Molecular Spectra: Atomic spectra — Energy level, quantum number and designation of states, selection rule. Molecular Spectra — Quantitative discussion of molecular bindings, molecular orbital, type of molecular energies, discussion of rotational, vibrational and electronic spectra.

Unit — III

Ultraviolet-visible and Infrared Spectrophotometry: Basic principle, instrumentation, qualitative and quantitative analysis, interpretation of spectra etc. Forensic application of UV-Vis. and IR spectrophotometry

Unit — IV

Atomic Absorption/Emission and X-Ray Spectrometry: Basic principle, instrumentation, qualitative and quantitative analysis, interpretation of spectra and its forensic application.

Unit — V

Radiochemical Techniques: Basic principles and theory, introduction about nuclear reactions and radiations, Neutron sources, Neutron Activation Analysis (NAA), Nuclear Magnetic Resonance Spectroscopy (NMR). Application of radiochemical techniques in forensic science.

Suggested Readings:

1. V.B. Patania; Spectroscopy, Campus Books International, (2004).
2. James W. Robinson; Atomic Spectroscopy, 2nd Edn. Revised & Expanded, marcel Dekkar, Inc, NY. (1996).
3. N. Subrahamanyam & Brij Lal; A text Book of Optics, S. Chand & Co. (2004).
4. Hobart H. Willard, Lynne L. Merrett Jr, John A Dean Frank A. Settle Jr; Instrumental Methods of Analysis, 7th Edn, CBS Pub. 86 Distributors (1986).
5. K.C. Thompson 8s R.J. Renolds; Atomic Absorption Fluorescence 86 Flame Emission Spectroscopy, A Practical Approach, 2nd Edn. Charles Griffin 86 Co. (178).
6. Robert M. Silverstein 86 Francis X Webster; Spectrometric Identification of Organic Compounds, 6th Edn., John Wiley 86 Sons, Inc. (1997).
7. P.S. Kalri; Spectroscopy of Organic Compounds, 4th Edn, New Age International Pub. (2001) w.e.f. 2005-2006.
8. D.R. Khanna 86 H.R. Gulati; Fundamentals of Optics Geometrical Physical 86 Quantum, 20th Edn., R. Chand 86 Co. (2002).
9. R.S. Khandpur; handbook of Analytical Instruments, Tata McGraw Hill Pub. Co. New Delhi (2004).
10. John A. Dean; Analytical Chemistry Handbook, McGraw Hill Inc. (1995).
11. Sharma P K: Instrumental Methods of chemical Analysis.
12. Sharma P K: Instrumental Methods of chemical Analysis.
13. Chatwal and Anand: Instrumental Methods of chemical Analysis.
14. Kriggle: Instrumental methods.

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**I Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical -I**
Practical Paper Title	**:**	**Crime Scene Investigation**
Subject Code	**:**	**MSCFSC-105**
Marks	**:**	**50**

Practicals

1. Basics of crime scene sketching.
2. Sketching of scene of crime.
3. Sketching of outdoor scene of crime (murder, suicide, accident etc)
4. Sketching of indoor scene of crime (theft, dacoity, murder, suicide etc)
5. Photography of scene of crime using manual & digital camera.
6. Methods for searching of physical evidences at scene of crime.
7. Collection, packing, labeling and forwarding of physical evidence from scene of crime to forensic science laboratory.

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**I Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical -II**
Practical Paper Title	**:**	**Questioned Documents, Finger Prints and Other Impressions**
Subject Code	**:**	**MSCFSC-106**
Marks	**:**	**50**

Practicals

1. Examination of various ink samples using planer chromatographic techniques.

2. Decipherment of secret, erased. obliterated, indented hand writing using physical/chemical technique.

3. Matching of hand writing and signatures (genuine/forged)

4. Examination of type written and printer generated prints.

5. Print your own 10 digit finger print card using black ink.

6. Primary and secondary classification of given finger print chart.

7. Location, development and lifting of latent finger print.

8. Casting and matching of foot/footwear print on soft surface.

9. Comparison of finger prints.

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COURSEWISE SCHEME
II[nd] SEMESTER

1. Course Code	: MSCFSC	5. Total Practical	: 2
2. Course Name	:M.Sc. Forensic Science	6. Total Practical Marks	: 100
3. Total Theory Subject	: 3	7. Total Marks	: 250
4. Total Theory Marks	: 150	8. Minimum Passing Percentage	: 36

Sub. Code	Subject Name	Theory									Practical		Total	
		Paper					CCE		Total					
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Compulsory														
MSCFSC 201	Instrumental Methods - Chemistry	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 202	Forensic chemistry and Explosives	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 203	Forensic Toxicology and Pharmacology	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 204	Scientific Investigation of Crime	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 204	**Practical-I** Instrumental Method - (Physical, Chemical and	0	0	0	0	0	0	0	0	0	50	18	50	18
MSCFSC 205	**Practical-II** Forensic Chemistry & Toxicology	0	0	0	0	0	0	0	0	0	50	18	50	18

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**II Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**I**
Practical Paper Title	**:**	**Instrumental Methods- Chemical**
Subject Code	**:**	**MSCFSC-201**
Marks	**:**	**50**

Unit-I

General idea and basic principle of distillation, Various types of distillation techniques Sample treatment techniques — Centrifuge, Filtration, Evaporation, Crystallization etc. Distribution Law, Solvent extraction technique like LLE, SPE, micro SPE.

Unit-II

Chromatographic techniques: Theory of chromatography, Classification of chromatography, General idea on planar chromatography, Column chromatography, Adsorption, Partition chromatography, General principles and working of Planer chromatography: TLC, PC, HPTLC Forensic Application of planar chromatography.

Unit-III

General principles and working of Column Chromatography Selection of mobile phase, column and detectors Ion-exchange chromatography Brief idea on working of HPLC, GC, Ion Exchange Chromatography, Exclusion (Permeation) chromatography, Affinity chromatography etc. Forensic Application of column chromatography.

Unit-IV

Electrophoretic techniques: General principles, Classification of electrophoresis Factors affecting electrophoresis, Preparative, Horizontal, Vertical, two dimensional electrophoresis Brief idea of Low voltage electrophoresis, High voltage electrophoresis, Gel electrophoresis, Isoelectric focusing etc General idea and working of Capillary Electrophoresis Forensic Application of electrophoresis, electrochemical techniques: General principles Electron transport process, Polarography and variants.

Unit-V

Mass Spectrometry (MS): Principle and Instrumentation, Correlation of MS with molecular structure. A brief idea about the various forms of Mass Spectrometry Coupling MS with GC, LC, and CE etc. Application of MS in Forensic Science

Suggested Readings:

1. Jarris, A.L. Gray & R.S. Hock, EDS; handbook of Inductively Coupled Plasma Mass Spectrometry; Glasgow Blockie, (1992)
2. Maclaffrty, F.W. & F. Turecek; Interpretation of Mass spectra; 4th ed Mill Valley, CA Univ. Science Books, (1993)
3. Chapmen, J.R.; Practical Organic Mass spectrometry, A Guide for Chemical and Biochemical Analysis, Wiley, New York, (1993)
4. Lindsay, S.; High Performance Liquid Chromatography, New York, Wiley (1992)
5. Sharma PK: Instrumental Methods of chemical Analysis.
6. Chatwal and anand : Instrumental Methods of chemical Analysis.
7. Kriggle: Instrumental Methods.
8. Willard, Merrit and Dean : Instrumental methods of analysis
9. Saferstein: Forensic Science Handbook Vol. I, II, III.
10. Lee Honry: An Introduction to Forensic Science.
11. Egon Stahl: Thin Layer Chromatography.
12. Shrivastava & Shrivastava : Introduction to chromatography

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**II Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**II**
Practical Paper Title	**:**	**Forensic Chemistry and Explosives**
Subject Code	**:**	**MSCFSC-202**
Marks	**:**	**50**

UNIT-I

Forensic Chemistry and its Scope Analysis of beverages: Alcohol and Non- alcoholic, country made liquor, illicit liquor

Drugs of abuse: Introduction, Classification, Narcotic drugs & psychotropic substances, drugs of abuse in sports.

UNIT-II

Brief Introduction to Drugs and cosmetic act, Excise Act, NDPS Act Analysis of Gold and Other metals in cheating cases.

UNIT- III

Examination of Petroleum Products: Distillation & Fractionation, various fraction and their commercial uses. Standard methods of analysis of petroleum products for adulteration.

Trap cases: purpose, examination of chemicals used in trap case Cement: Composition, types and Forensic analysis, Mortar & Concrete

UNIT-IV

Fires: Nature and Chemistry of fire, Classification, Igniters of fires, Phases of fires, Main types of fires, Examination of scene of fires Arson: Relevant IPC sections, Motives, Analysis of Accelerants

UNIT-V

Explosives: Classification, Comparison & characterization of explosives, Military & Commercial explosives, Detection of Explosophores (anions), Detection of Black powder, Nitrocellulose and Dynamite, Quantitative determination.

Suggested Readings:

1. Maudham Bassett etal; Vogel's Textbook of Quantitative Chemical Analysis, 6th Ed., Longman Essex (2004)
2. I. L. Finar; Organic Chemistry Vol. II Pearson Education (Singapore)
3. R.T. Morrison, R.N. Boyd; Organic Chemistry, 6th Ed., Prentice Hall, new Delhi (2003)
4. Brean S. Furniss etal; A.I Vogel Textbook of Practical Organic Chemistry, Addison Wesley Longman, Edinburg (1998)
5. A. Burger; Medicinal Chemistry, Vol. II, Wiley Interscience, NY (1970)
6. D A Skoog, D.M. West, F.J. Holler; Analytical Chemistry — An Introduction, 7L11 Ed., Saunders College Pub. Philadelphia, USA (2000)
7. Boudreau JE, etal; Arson & Arson Investigation, Survey 8s Assessment National Institute of Law Enforcement, U.S. Deptt of Justice, US Govt Printing Press (1977)
8. Dettean J D; Kirk's Fire Investigation, 5th Ed., Prentice Hall, Eaglewood Cliffs, N.J. (2002) w.e.f. 2005-2006.
9. Yinon Jitrin; Modern Methods 8z, Application in Analysis of Explosives, John Wiley 86 Sons, England (1993)
10. Working Procedure Manual — Chemistry, Explosives and Narcotics, BPR&D Pub. (2000)
11. C.A. Watson; Official and standardized Methods of Analysis. Royal Society of Chemistry, UK (1994) 12. Feigl; Spot Test in Inorganic Analysis, Elsevier Pub. New Delhi (2005).
12. Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi (2005).
13. Silverman; Organic Chemistry of Drug Design & Drug action, Elsevier Pub. New Delhi (2005)
14. Abraham Burger; Medicinal Chemistry & Drug Discovery, 6 Vol Set, 6th Ed., John Wiley 86 Sons, NY (2004)

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**II Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**III**
Practical Paper Title	**:**	**Forensic Toxicology and Pharmacology**
Subject Code	**:**	**MSCFSC-203**
Marks	**:**	**50**

UNIT-I

Forensic Toxicology: Introduction, concept and Significance Poisons: Definition, Classification of poisons, Types of poisoning sign and symptoms of poisoning, mode of action, factors modifying the action of poisons, Toxicological exhibits in fatal and survival cases, their preservation Treatment in cases of poisoning, Analysis report

UNIT-II

Extraction, Isolation and Clean-up procedures: Non-volatile organic poison, Stas-otto. Dovbriey Nickolls (Ammonium sulphate) method, acid digest and Valov (Tungstate) methods, Solid phase micro extraction techniques, Solvent extraction methods.

Volatile Poisons: Industrial solvent acid and basic Distillation
Toxic Cations: Dry Ashing and Wet digestion process
Toxic Anions: Dialysis method total alcoholic extract

UNIT-III

General Study and Analysis: Barbiturates, methaqualone, Hydromorphine, Methadone, Meprobamate, Mescaline, Amphetamines, LDS, Heroin, Cannabinoids, Phinothiazines
Insecticides: Types, General methods for their analysis.
Alkaloids: Definition, classification, Isolation and General characterization.

UNIT-IV

Forensic Examination of Metallic Poisons: Arsenic, Mercury, Lead, Bismuth, Copper, Aluminium, Iron, Barium, Zinc Analysis of Ethyl Alcohol in blood and urine, illicit liquor, Methanol, Acetone, Chloroform, Phenol Snake venoms and Poisons, Irrespirable gases.

UNIT-V

Forensic Pharmacological studies: Absorption, Distribution, Metabolism, Pathways of drug metabolism General studies and Analysis of some vegetable poisons, Opium, Abrus. Cynanogenetic glycosides, Dhatura, Marking nuts, Nux-vomica, Oleander and Aconite.

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**II Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**IV**
Practical Paper Title	**:**	**Scientific Investigation of Crime**
Subject Code	**:**	**MSCFSC-204**
Marks	**:**	**50**

Unit I:

Physical patterns:

Introduction, Physical patterns in identification, individualization and reconstruction.

Pattern due to blood, Pattern on glass, firearms related patterns, patterns in arson and fires served articles and physical matches, comparison of imprints, indentation, striation, typical presentations, Gait patterns, Bite patterns.

Modus operandi, portrait parley.

Unit II:

Death Investigation:

Cause of death (Natural and Unnatural), Determination of nature of death and general characteristics of suicides, murder and accidents.

Impression of body at scene of crime, inspection of scene of crime. Role of skeletal remains in investigation. Forensic investigation in firearm related cases. Forensic investigation in asphyxia deaths.

Unit III:

Forensic investigation in poisoning cases

Motor Vehicle Investigation: Identification search of physical evidences. Involvement of vehicle in crime, theft investigation. Investigation in hit and run case

Unit IV:

Investigation in offences against properties: Burglary and Robbery investigation in fire, Investigation in Arson Cases.

Unit V:

Investigation in explosive related cases. Investigation in Bank Frauds.

DNA in Police Work: With special reference to role of DNA in sexual offence, disputed paternity, child swapping, identity in dead and living person, civil immigration. Veterinary and wild life and agriculture cases. Legal standards of admissibility of DNA Profiling

Suggested Readings:

1. B.R. Sharma: Forensic Science in Criminal Investigation and Trials, Universal Law Publishing; Fourth edition 2013.
2. James, S.H and Nordby, J.J.: Forensic Science: An introduction to scientific and investigative techniques 3rd edit. CRC Press, USA.
3. Nanda, B.B. and Tewari, R.K.: Forensic Science in India: A vision for the twenty first century Select Publisher, New Delhi (2001)
4. Richard Saferstein. Criminalistics: An Introduction to Forensic Science. 10th edit Prentice-Hall, New Jersey.
5. Deforest, Gansellen & Lee : Introduction to Criminalistics.
6. Kirk (2000) Vehicular Accident investigation and reconstruction.
7. 3. H. James, Wouldiam G. Eckert (1999) Interpretation of Blood stain evidence at Crime Scene, 2nd edition, CRC Press.
8. N. Gilbert (1993) Criminal Investigation; Third edition, Macmillan Publishing company.
9. Bernard Robertson and G.A. Vignaur (1995) Interpreting evidence John Wiley and Sons Ltd.
10. Kirk (1953) Criminal Investigation Interscience Publisher Inc. New York.
11. B. R. Sharma (1980) Footprints, Tracks and Trials. Central Law Agency. Allahabad.
12. Koblinsky et al. (2005) DNA -Forensic and Legal Implications.

Swami Vivekanand University, Sagar (M.P.)

Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**II Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical –I**
Practical Paper Title	**:**	**Instrumental Methods (Physical, Chemical & Biological) and Forensic Chemistry**
Subject Code	**:**	**MSCFSC-205**
Marks	**:**	**50**

Practicals

1. To understand the working and measurement of A max of various organic compounds by UV-Vis. Spectrophotometer.
2. To know the concentration of given liquid by colorimeter.
3. To identify the given compounds using thin layer and paper chromatography.
4. To know practical working and handling of high performance liquid chromatography.
5. To know practical working and handling of gas chromatography.
6. To know practical working and handling of low voltage and high voltage electrophoresis.
7. To know practical working and handling of compound and stereo microscope.
8. Separation and identification of volatile liquid by simple distillation.
9. Identification of salts and metals by simple colour test and group analysis.
10. Identification of different vegetable poison by colour test, chromatography etc.
11. Identification of insecticides and pesticides by TLC/ colour test.

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Session: 2017-18

Class	**:**	**M.Sc.**
Semester	**:**	**II Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical –II**
Practical Paper Title	**:**	**Forensic Toxicology and Scientific Investigation**
Subject Code	**:**	**MSCFSC-206**
Marks	**:**	**50**

Practicals

1. Extraction and identification of drugs/ toxicants from biological matrix and their detection.
2. To study and examine tool marks and mechanical fits.
3. To study droplet dynamics of blood on various surfaces and different heights and angles.
4. Reconstruction and evaluation of various scenes of crime.
5. To measure the Gait of Individuals under various circumstances.
6. To study various wear and tear characteristics on footwear.
7. Sweat Analysis of palmer and plantar surfaces.
8. To examine anatomical difference in footprints of individuals. Under various circumstances.

Swami Vivekanand University, Sagar (M.P.)

COURSEWISE SCHEME
III[rd] SEMESTER

1. Course Code	: MSCFSC	5. Total Practical	: 2
2. Course Name	: M.Sc. Forensic Science	6. Total Practical Marks	: 100
3. Total Theory Subject	: 4	7. Total Marks	: 300
4. Total Theory Marks	: 200	8. Minimum Passing Percentage	: 36

Sub. Code	Subject Name	Theory									Practical		Total	
		Paper					CCE		Total					
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Compulsory														
MSCFSC 301	Digital Forensic and Cyber Crime	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 302	Advance Criminilistics	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 303	Forensic Biology and DNA Profiling	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 304	Forensic Psychology	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 305	**Practical-I** Digital Forensic Cyber Crime	0	0	0	0	0	0	0	0	0	50	18	50	18
MSCFSC 306	**Practical-II** Forensic Biology, Psychology and DNA Profiling	0	0	0	0	0	0	0	0	0	50	18	50	18

Session: 2018-19

Class	**:**	**M.Sc.**
Semester	**:**	**III Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**I**
Paper Title	**:**	**Digital Forensic and Cyber Crime**
Subject Code	**:**	**MSCFSC-301**
Marks	**:**	**50**

Unit I: Digital Forensic I (Basics)

What is Cyber Crime and digital evidence, types of cyber crimes, digital evidence, Digital Vs Physical Evidence, Nature of Digital Evidence, Precautions while dealing with Digital Evidence. Introduction to Cyber forensic, Cyber forensic steps (Identification, Seizure, Acquisition, Authentication, Presentation, Preservation), Computer forensic expert, Cyber forensic investigation process, The goal of the forensic investigation, Theft of information, Violation of security policies or procedures, Intellectual property infractions, Electronic tampering), Determine the impact of incident, Auditing V/s Cyber forensic investigations.

Unit II: Digital Forensic II

Seizure of suspected computer. Preparation required prior to seizure. Protocol to be taken at the scene. Extraction of information from the hard disk. Treatment of exhibits. Creating bitstream of the original media. Collection and seizure of magnetic media. Legal and privacy issues. Examining forensically sterile media. Restoration of deleted files. Password cracking and E-mail tracking. Encryption and decryption methods. Tracking users.

Unit III: Cyber Forensic Tools and Utilities

Introduction, Examining a Breadth of Products, Cyber Forensic Tools Good, Better, Best: What's the Right Incident Response Tool for Your Organization? , Tool Review Forensic Toolkit, EnCase, Cyber check suites, what is disk Imaging etc. Specifications for Forensic tools Tested.

Unit IV: Evidence Collection and Analysis Tools

Volatile and Non volatile Evidences collection (Safeback, Gettime, FileList,Filecvt and Excel, Getfree, Swapfiles and Getswap ,GetSlack, Temporary Files), Detailed Procedures for Obtaining a bit stream backup of hard drive, File System (Details of File system, Data

Structure Of File System, Data Recovery in Different file system).

Unit V: Cyber Crime

Definition and types of computer crimes. Distinction between computer crimes and conventional crimes. Reasons for commission of computer crimes. Computer virus, and computer worm – Trojan horse, trap door, super zapping, logic bombs. Types of computer crimes – computer stalking, pornography, hacking, computer terrorism. An overview of hacking, spamming, phishing and stalking.

Practicals:

1. Identification , Seizure , Search of Digital media Evidence Collection
2. Demonstration of various Forensic tools like Partition magic, Encase etc.
3. Data Recovery, Deleted File Recovery viewing small Disk.
4. Demonstration of Concealment Techniques (Cryptography PGP)
5. Demonstration of Concealment Techniques (Stenography)
6. Demonstration of other Concealment Techniques
7. To trace routes followed by e-mails and chats.
8. To identify the IP address of the sender of e-mails.
9. To demonstrate concealment techniques using cryptographic PGP
10. To acquire data from PCs/laptops/HDDs/USBs, pen drives, memory cards and SIM cards.
11. To use symmetric and asymmetric keys for protection of digital record.
12. To carry out imaging of hard disks from different software
13. Networking commands- like ping, IP config. Etc.
14. Tracing E-mail, finding senders IP address, of received email, tracing route of email received using tool available on internet,e.g. Visual Trace Route etc.

Suggested Readings:

1. Digital Forensics: Digital Evidence in Criminal Investigations by *Angus McKenzie Marshall*
2. Cyber Forensic A Field Manual for Collecting, Examining and Preserving Evidence of Compute Crimes by *Albert J Menendez.* Auerbach Publications.
3. Cyber Forensic by *Marecella Menendez.*
4. Computer Forensic by *Newman*.
5. Cyber Crime Investigation Field Guide, by *B Middleton*
6. Incident Response and Computer Forensic by *Kelvin Mandia*, TMH Publication.

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Class	**:**	**M.Sc.**
Semester	**:**	**III Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**II**
Paper Title	**:**	**Advance Criminilistics**
Subject Code	**:**	**MSCFSC-302**
Marks	**:**	**50**

Unit I :

Crime Scene Investigation (CSI): Types of crime scenes: indoor, outdoor, mobile, & hydro. Physical evidences, Crime scene search methods, Recovery & packaging of evidences, Crime scene documentation: Notes taking, Sketching, Photography & Videography. Preservation of evidences.

Unit II:

Various Crime Scenes: Homicide, Suicide, Accidents (Vehicular, Train, Air-crash, Industrial etc), Mass Murders, House Breaking and Theft (HBT), Dacoity, Cybercrimes, Terrorism, etc. Crime Scene Management (CSM): Introduction & Components: Information, Manpower, Technology & Equipment and Logistics Management. Role of various experts at crime scene. Security, safety and preservation of crime scene. Contamination control. Scene Survey and initial documentation.

Unit III:

Report and Evidence Evaluation: Components of reports and Report formats in Crime Scene and findings. Constitutional validity of Forensic Evidence, Expert Testimony: Admissibility in of law, Pre-Court preparations & Court appearance.

Unit IV:

Recent techniques of development of latent fingerprint: Digital imaging and enhancement, Laser and other radiation based techniques, Metal deposition method. Development and preservation of latent print on skin: Living and Dead. Photography and image processing of fingerprints. Comparison of fingerprints: Class characteristics, individual characteristics, ridge tracing and ridge counting. Automated fingerprint identification system

AFIS: History, developments and components, Latent print and high quality image processing. Types of AFIS searches and reports.

Footprints: Importance, Gait pattern analysis, Evaluation and analysis of various casts. Electrostatic lifting of latent footprints and comparison with reference sample.

Unit V:

Tyre marks / prints and skid marks and comparison with control samples.

Cheiloscopy: Nature, location, collection and evaluation of lip print.

Ear prints: Introduction, growth & development, evaluation and analysis of ear print. Tool marks & Mechanical fits.

Suggested Readings:

1. Bevel, T., Gardner, M. R., Bloodstain Pattern Analysis with an Introduction to Crime Scene Reconstruction, Third Edition.
2. Bevel, T., Gardner, M. R., Practical Crime Scene Analysis and Reconstruction
3. Lee, C. H., Palmbach, T., Miller, T. M., Henry Lee's Crime Scene Handbook
4. Moenssens : Finger Prints Techniques, 1975, Chitton Book Co., Philadelphia, New York.
5. Mehta, M. K. : Identification of Thumb Impression & Cross Examination of Finger
6. Prints, 1980 N. M. Tripathi (P) Ltd. Bombay.
7. Bridges : Practical Finger Printing, 1942, Funk and Washalls Co. New York.
8. Holt : Genetics of Dermal Ridges.
9. William J. Bodziak (1989) Footwear Impression Evidence Elsevier Science Publishing Co. New York, 1989.
10. James, S.H and Nordby, J.J.. (2003) Forensic Science : An introduction to scientific and investigative techniques CRC Press, USA.
11. Saferstien : Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA.
12. Kirk : Criminal Investigation, 1953, Interscience Publisher Inc. New York.
13. Cummins & Midlo : Finger Prints, Palms and Soles, 1943, The Blakiston office London.
14. O'Hara & Osterburg : Introduction to Criminalistics, 1949, The MacMillan Co., 1964

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Class	**:**	**M.Sc.**
Semester	**:**	**III Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**III**
Paper Title	**:**	**Forensic Biology and DNA Profiling**
Subject Code	**:**	**MSCFSC-303**
Marks	**:**	**50**

Unit- I:

Blood: Composition, histology, examination of blood and blood stains, Identification of lochial and menstrual stains by various methods.

Semen: Composition, St. of spermatozoa, Forensic method of detection and identification of semen and seminal stain examination. Identification and examination of other body fluids/ stains- vaginal, saliva, urine, pus, faeces, vomit, milk, sweat and tears.

- **Hair:** Structure, Forensic examination of Hair including determination of origin race, sex, site, etc.
- **Fibers:** Type and Forensic aspects of fiber examination – fluorescent, optical properties, refractive index, birefringence, dye analysis etc and natural fiber.

Unit- II

Forensic Odontology: Detinition pattern, structure of teeth, age determination- identification of person, role in mass disaster, disease of teeth and their significance in personal identification.

Determination of Stature and sex from bones, Identification of burnt bones, recovery and identification of skeletal remains in accidental cases and mass disasters. Facial reconstruction.

Unit- III: Forensic Serology

Basic Concept of Genetics : Mendelian genetics, genotypes, phenotypes, mutation, multiple alleles, Expression of Gene and Gene Mapping. Analysis of protein by electrophoretic methods.

Immunology: Immuno System, Immuno response, Antigens, haptens and adjuvant, Immunoglobulin's, Structure and function, raising of anti-sera, Antigen-Antibody reaction. Lectins and their forensic significance.

Serogenetic markers:

- **Blood group**: History, Biochemistry and genetics of ABO, Rh, Mn and other systems, method 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, etc. blood group specific ABH substance, determination of secretors/non secretor status, Lewis antigen, Bombay blood group.
- **Polymorphic enzymes typing-** PGM, ESD, EAP, AK, etc., and their forensic significance, HLA typing, role of serogenetic markers in individualization, paternity disputes etc.

Unit IV:

Forensic Botany: Various types of wood, timber varieties, seeds and leaves – their identification and matching. Diatoms – morphology, types, methods of isolation, and forensic importance

Identification of pollen grains, starch grains, powder and stains of spices etc, Isolation, classification and identification of microbial organism.

Forensic Entomology: significance of terrestrial and aquatic insects in forensic investigations and their role in crime detection, insect's succession and its relationship to determine time since death. Impact of ecological factors on insect's developments.

Unit – V:

Structure of DNA, Damage to DNA, variation in DNA, DNA as excellent polymorphic markers

Legal perspective: Legal standard for admissibility of DNA profiling – procedural & ethical concerns, status of development of DNA profiling in India & abroad.

DNA typing technique – RFLP, PCR, Amplification, PCR based typing methods such as HLA DQ_{A1} Amply- type $^{(R)}$ PM Polymarkers, D 1580, STR, Gender ID, mt- DNA methods with their merits and demerits. Comparison of RFLP and PCR based method, Forensic Significance of DNA Profiling

Practicals:

1. Preliminary examination of Blood
2. Confirmatory examination (Crystal test) of blood
3. To Determine Species of Origin from Blood by Gel diffusion method
4. To determine the ABO and Rh factor of human blood.
5. Morphological examination of human and animal hairs
6. Preparation of slide for scale pattern study of hairs
7. Identification of species from the given hair sample.
8. Examination of given fibre by physical and chemical method.

9. Detection of salivary stains.
10. Draw and label and identify the bones of human body.
11. Determine age and sex from long bones and skull.
12. To isolate and examine diatoms and classify them.
13. Isolation of microbial from air.

Suggested Reading:

1. Albert's, B, Bray, D, Lewis, J, Roberts K & Watson, J.D; Molecular Biology of cell, 2nd ed. Garland Pub. New York (1989)
2. Biology Methods manual; Metropolitan Police Forensic Science Laboratory, London; (1978)
3. Daniel L. Hartl & Elizabeth W. Jones; Genetics- Principle & Analysis, 4th Ed., Jones & Bartlet Pub. 1998.
4. E.J. Gardner, M.I. Simmons and D.P. Snustad; Principles of Genetics; John Wiley, New York; (1991)
5. Edwin, H. Mc Caney-Human Genetics, The Molecular Revolution, Jones & Bartlett Pub. London; (1993)
6. H.G. Greenish & E. Collin; An anatomical Atlas of vegetable Powders; J&A Churchill, London; (1904)
7. Herbert R. Mauersberger; Mathews Textile Fibers – their physical, Microscopic and chemical properties; John Wiley, New York; (1954)
8. Jaiprakash G. Shewale, Ray H. Liu Forensic DNA Analysis: Current Practices and Emerging Technologies, CRC Press, 2013
9. John M Butler: Forensic DNA Typing. Elsevier Academic Press.
10. Keith Immen and Norah Rudus, 1997. An introduction to Forensic DNA Analysis. CRC Press, New York.
11. Kimball, John W; Biology; Arvind Publishing Co. New Delhi (1974)
12. Lee M.C. and Gaenesten, R.E: DNA and other Polymorphism in Forensic Science. Year book Medical Published.
13. P.L. Williams and R. Warwick; Gray's anatomy; Churchill Livingston, London; (1980)
14. R.P. Pandey, Plant Anatomy; S. Chand, new Delhi; (1998)
15. Richard Saferstein; Forensic Hand Book; Ed.; Prentic Hall, Englewood Cliff, New Jersey; (1982)

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Class	**:**	**M.Sc.**
Semester	**:**	**III Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**IV**
Paper Title	**:**	**Forensic Psychology**
Subject Code	**:**	**MSCFSC-304**
Marks	**:**	**50**

Unit I:

Interviewing and Interrogation Techniques: Importance of Investigative Interviewing, Influence of Psychology, P.E.A.C.E Model of Interviewing, Cognitive Interviewing, Ethical Interviewing, Other Interview Techniques.

Unit II:

Interrogation and the related Techniques, Brain Electrical Oscillation Signature Profiling (BEOS), Voice-Stress Analysis/ Layered Voice Analysis, reliability, Limitations, NHRC Guidelines, Admissibility on the Court, Case Studies.

Unit III:

Polygraph/Lie Detector Test: Objectives, theoretical basis, stages of examination (Pre-test, In-test, post-test), Questioning techniques, Stim test, Limitations, Admissibility in the court of law, NHRC guidelines, case studies, etc.

Unit IV:

Brain Fingerprinting/Brain-Mapping: Principle**,** Importance**,** History, process, brain waves (P300, delta, theta, gamma, alpha), reliability, case studies, admissibility, etc..**Narco-analysis:** Principle, History, drugs used, procedure, reliability, admissibility, limitations, Indian scenario, case studies, etc.

Unit V:

Legal & Correctional Aspects: The mentally ill in court, Competency to stand trial Mental Health Act, 1987: (Object, Relevant Definitions, Central & State authority, Reception Orders, Human Rights of Mentally ill persons, Penalties & Case-Studies), Indian Penal Code, 1860 : Relevant general exceptions. Rehabilitation & Correctional Treatment of Offender(s) / Victim(s), Techniques, Strategies and Types of Treatments.

Practicals:

1. NEO-PI
2. Minnesota Multiphasic Personality Inventory-2/A (MMPI-2/A)
3. Rorschach Test
4. Bhatia's Battery for Intelligence
5. Thematic Apperception Test
6. Word Association Test

Suggested Readings:

Forensic & Correctional Psychology

1. 'Criminology' by Larry Siegel
2. 'Introduction to Forensic Psychology' by Bruce Arrigo
3. 'Forensic & Criminal Psychology' by Dennis Howitt.
4. 'Abnormal Psychology' by Halgin&Whitbourne.
5. 'Abnormal Psychology', by Robert C. Carson, James N. Butcher, Susan Mineka, Jill M. Hooley thirteenth Edition, Thirteenth Edition.
6. 'Encyclopedia of Forensic Science' by Jay A. Siegel, PekkaJ. Saukko, Geoffey C. Knupfer, Volume-1 to Volume-5.
7. 'Mental Disorders and Treatment' by Katherine Marsland.
8. 'Handbook of Forensic Psychology' by Prof. Dr.VimalaVeeraraghavan.
9. 'Handbook of Polygraph Testing' by Murray Kleine.
10. 'Brain Mapping-The Methods' by Arthur W. Toga & John C. Mazziotta, Second Edition.
11. 'Criminal Profiling and Introduction to Behavioural Evidence Analysis' by Brent Turve, Second Edition.
12. Krishnamurthy, R., Introduction to Forensic Science in Crime Investigation, 2011, Selective & Scientific Books, New Delhi.
13. 'Forensic Psychology' by Graham Towel& David Crighton
14. Serial Crime, Theoretical & Practical issues in Behavioural Profiling, Petherick, Woodworth Publication.
15. 'Introduction to Forensic Psychology', by Bruce Arrigo.
16. Diagnostic & Statistical Manual-IV TR, American Psychological Association
17. DSM-IV Mental Disorders Diagnostics, Etiology and Treatment, by Michaen, Allan.
18. 'Psychological Testing' by Anne Anastasi, Susana Urbina, Seventh Edition.
19. 'Psychological Testing' by Robert J. Gregory, Fourth Edition.

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Class	**:**	**M.Sc.**
Semester	**:**	**III Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical –I**
Practical Paper Title	**:**	**Digital Forensic Cyber Crime**
Subject Code	**:**	**MSCFSC-305**
Marks	**:**	**50**

Practicals:

1. Identification , Seizure , Search of Digital media Evidence Collection
2. Demonstration of various Forensic tools like Partition magic, Encase etc.
3. Data Recovery, Deleted File Recovery viewing small Disk.
4. Demonstration of Concealment Techniques (Cryptography PGP)
5. Demonstration of Concealment Techniques (Stenography)
6. Demonstration of other Concealment Techniques
7. To trace routes followed by e-mails and chats.
8. To identify the IP address of the sender of e-mails.
9. To demonstrate concealment techniques using cryptographic PGP
10. To acquire data from PCs/laptops/HDDs/USBs, pen drives, memory cards and SIM cards.
11. To use symmetric and asymmetric keys for protection of digital record.
12. To carry out imaging of hard disks from different software
13. Networking commands- like ping, IP config. Etc.
14. Tracing E-mail, finding senders IP address, of received email, tracing route of email received using tool available on internet,e.g. Visual Trace Route etc.

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Class	**:**	**M.Sc.**
Semester	**:**	**III Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical –II**
Practical Paper Title	**:**	**Forensic Biology, Psychology and DNA Profiling**
Subject Code	**:**	**MSCFSC-306**
Marks	**:**	**50**

Practicals:

1. Preliminary examination of Blood
2. Confirmatory examination (Crystal test) of blood
3. To Determine Species of Origin from Blood by Gel diffusion method
4. To determine the ABO and Rh factor of human blood.
5. Morphological examination of human and animal hairs
6. Preparation of slide for scale pattern study of hairs
7. Identification of species from the given hair sample.
8. Examination of given fibre by physical and chemical method.
9. Detection of salivary stains.
10. Draw and label and identify the bones of human body.
11. Determine age and sex from long bones and skull.
12. To isolate and examine diatoms and classify them.
13. Isolation of microbial from air.
14. NEO-PI
15. Minnesota Multiphasic Personality Inventory-2/A (MMPI-2/A)
16. Rorschach Test
17. Bhatia’s Battery for Intelligence
18. Thematic Apperception Test
19. Word Association Test

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COURSEWISE SCHEME
IV^{rth} SEMESTER

1. Course Code	: MSCFSC	5. Total Practical	: 2
2. Course Name	:M.Sc. Forensic Science	6. Total Practical Marks	: 100
3. Total Theory Subject	: 4	7. Total Marks	: 300
4. Total Theory Marks	: 200	8. Minimum Passing Percentage	: 36

Sub. Code	Subject Name	Theory									Practical		Total	
		Paper					CCE		Total					
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Compulsory														
MSCFSC 401	Emerging trends in Forensic Science.	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 402	Wild Life	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 403	Criminology, Criminal Law and Police Administration	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 404	Advanced Forensic Ballistics	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCFSC 405	**Practical-I** Emerging trends in Forensic Science.	0	0	0	0	0	0	0	0	0	50	18	50	18
MSCFSC 406	**Practical-II** Advance Forensic Ballistics	0	0	0	0	0	0	0	0	0	50	18	50	18

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Class	**:**	**M.Sc.**
Semester	**:**	**IV Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**I**
Paper Title	**:**	**Emerging trends in Forensic Science.**
Subject Code	**:**	**MSCFSC-401**
Marks	**:**	**50**

Unit I: Structure of DNA, Techniques in DNA typing, RFLP, PCR, Factors affecting DNA, Damage to DNA, Variation in DNA, DNA as excellent polymorphic marker, Basis of DNA typing, Introduction to touch DNA- its future prospectus.

Unit II: Basics of Narco analysis and its significance in forensic science, Brain fingerprinting and its use in the criminal identification, Polygraph analysis , Voice production theory-vocal anatomy, Speech signal processing & pattern recognition- basic factors of sound in speech, acoustic characteristics of speech signal, Basic introduction to computers forensics, hardware and accessories, operating system and software.

Unit III: Biometrics in Personal Identification: Introduction, Concepts of Biometric Authentication, Role in person Identification, Techniques and Technologies (Finger Print Technology, Face Recognition, IRIS, Retina Geometry, Hand Geometry, Cheiloscopy, Rugoscopy, Poroscopy, Ridgeology, Signature Verification and other forensic related techniques).

Unit IV: Environmental Forensics: Definition, Legal processes involving environmental forensic science. Geo-forensics Global Positioning System; Basic principles and applications.

Unit V: Bioterrorism: Definition, Concepts of Biosecurity and microbial forensics, Weapons of mass destruction (WMD), mass-casualty weapons (MCW), Concept of NBC(Nuclear Biological and Chemical) and CBRNE (Chemical, Biological, Radiological, Nuclear, and high yield Explosives), Dirty Bombs.

Practicals

1. To study the Structure of DNA and techniques used in DNA profiling
2. Techniques used in detection of deception
3. Basics of Computer hardware and accessories
4. Introduction to Operating system and their types
5. Biometrics in Face recognition
6. Individualization of a person from Lip Print

7. Identification of a person by Ridgeology
8. Identification of a person from IRIS and Retina
9. Basic principles and application of Geo-Forensics
10. To study the basics of Environmental Forensics
11. Concept of WMD
12. Study of CBRNE

Suggested Readings:

1. Saferstein: Criminalistics – An Introduction to Forensic Science, Prentice hall Inc. USA

91995).

2. James, S.H. and Nordby, J.J; Forensic Science; an Introduction to Scientific and Investigative

Techniques, CRC Press, USA (2003).

3. O' Hara & Osterberg : An Introduction to Criminalistics.

4. Lee, Honry : Advances in Forensic Science.

5. Sharma B R: Forensic Science in Criminal Investigation and trials.

6. Mordby, J Deed Reckoning – The Art of For Forensic Science Detection, CRC Press LLC, Boca Raton FL, CRC Press (2000

7. Jorg T. Epplen Thomas Lubjumhin, DNA Profiling and DNA Fingerprinting; Birkhauser

Verlag, Basel, 1995.

8. Leshin, C.B., Internet Investigation in Criminalistics, Prentice Hall, New Jersey, 1997.

9. Tessarolo, A.A. and Marignani, A., Forenisc Science and the Internet. The Canadian Society of

Forensic Science Journal, Vol. 29, 1996.

10. Nanda, B.B. and Tewari, R.K. (2001) Forensic Science in India: A vision for the twenty first century Select Publisher, New Delhi.

11. Hess, A.K. and Weiner, I.B. (1999) Handbook of Forensic Psychology 2nd Ed. John wiley &

sons.

12. J A Siegel, P.J Saukko (2000) Encyclopaedia of Forensic Sciences Vol. I, II, III, Acad. Press 9

13. Brain Experience – C.R.Mukundan

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Class	**:**	**M.Sc.**
Semester	**:**	**IV Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**II**
Paper Title	**:**	**Wild Life**
Subject Code	**:**	**MSCFSC-402**
Marks	**:**	**50**

Unit I:

Wildlife Forensic: Protected and endangered species of animals and plants; Sanctuaries and their importance; Relevant provision of wild life and environmental act; Types of wildlife crimes, different methods of killing and poaching of wildlife animals; Enforcement of wildlife protection policy, Wild animals as pharmacopeias, Wildlife artifacts(Bones, skin, fur , hair, nails, blood, feather, etc.), Trade in wild animals, elephant-, Indian rhino, wild cat, poisonous snakes for venom and skin, crocodiles, salamanders, deer, birds (feathers Macau parakeets, whales, sharks, spectacle bear, Himalayan antelopes. Recovering evidence at poaching scenes, Locating the burial: Anomalies on the surface international trade in reptile skins, Challenges to species identification of reptile skin products, species and products represented in the reptile skin trade, reptile scale morphology basics and current limitations, Identifying features of major reptile groups. Wildlife (Protection) Act-1972 .

Unit II:

Environmental Forensics: Introduction to Environmental Forensics. Mercury- Natural and anthropogenic sources, detecting mercury in indoor environment and forensic aspects. Asbestos- sources and detection in air, water, fibres etc. Sewage, Lead- sources, compounds, analytical methods and lead forensics. Arsenic- sources, compounds, analytical methods and forensic aspects. Pesticides- Types, analytical testing and forensic techniques. Polycyclic aromatic hydrocarbons (PAHS)- sources, types and analytical techniques. Crude oil and refined products- oil analysis methods, oil spill analysis protocol

Unit III:

Environment and Ecosystems: Ecosystem characteristics structure and function; environmental pollution , xenobiotic and recalcitrance, Introduction to BOD and COD, use of biosensors to determine the quality of environment, Introduction and scope of environmental management, basic concepts of sustainable development, Environmental Impact Assessment (EIA),

general guidelines for the preparation of environmental impact statement (EIS), international

organization for standardization (ISO),

Unit IV:

Environmental Legislation: central and state boards for the prevention and control of environmental pollution, powers and functions of pollution control boards, penalties and procedure, duties and responsibilities of citizens for environmental protection.

Unit V:

The Water (Prevention and Control of Pollution) Act 1974. Prevention and Control of Air Pollution Act 1981, Forest Conservation Act 1981, Environment (protection) Act 1986, Hazardous waste (Management and Handling) Rules, 1989, Bio-Medical Waste (Management and Handling) Rules,
1998. Issues involved in enforcement of environmental legislation, public awareness, and public interest litigations (PILs) and its role in control of environmental pollution in India.

Suggested Reading:

1. Forensic science in wild life investigation, Linarce, Adrian CRC Press, Taylor & Francis
2. The wild life (protection) act, Baalu, T.R.1972, Nataraj Publication
3. Wild life (Protection act, 1972), Universal Publication
4. Wildlife protection act, 1972; Natraj Publishers
5. Instrumental Methods of Analysis6th Edition. (1986): H.H. Willard, L.L. Merritt Jr. and others.CBS Publishers and Distributors.
6. Instrumental Methods of Chemical Analysis. (1989):Chatwal G and Anand, S.Himalaya Publishing House, Mumbai.
7. A Biologists Guide to Principles and Techniques of Practical Biochemistry. (1975): Williams, B.L. and Wilson, K.

Swami Vivekanand University, Sagar (M.P.)

Session: 2018-19

Class	**:**	**M.Sc.**
Semester	**:**	**IV Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**III**
Paper Title	**:**	**Criminology, Criminal Law and Police Administration**
Subject Code	**:**	**MSCFSC-403**
Marks	**:**	**50**

Unit 1: Crime

Definition, concept and scope of crime. Types of crime. Causes, effects, control and prevention of crime. Recent developments.

Unit 2: Criminology and criminal anthropology

Aim and scope of criminology; Criminal behavior and theories of criminal behavior: classic, positivist, sociological. Organized crimes, white collar crime. Juvenile delinquency. Role of correctional institutions. Criminal profiling and modus operandi, portrait parley, voice stress analysis. Victimology.

Unit 3: Criminal Law

Indian Penal Code: sections-23, 24, 25,39,44,52,76-79,84-86.
Criminal Procedure Code: sections-2, 6-35, 41-60, 61-90,154-176, 293, 294.

Unit 4: Criminal Law & Charges

Charges: bailable/non-bailable offences, cognizable/ non-cognizable, summon case and warrant cases. Indian Evidence Act: sections- 3, 24-30, 45, 135-138, 141. Expert testimony.
NDPS Act, Food and Adulteration Act, Drugs and Cosmetic Act, Arms Act, Explosives Act.

Unit 5: Police Administration

History and development of police administration; Police duties, responsibilities and powers. Organization and structure of police station; maintenance of crime records and accountability of police to law. People and society. Custodial deaths, Police and Human Rights.

Suggested Readings

1. Swansan, C.R, Terrbles, L & Taylor,R.W; Police Administration, Prentice Hall, USA, 1998.

2. Gross.H; Criminal Investigation- A Practical Textbook for Magistrates, Police Officers, and Lawyers; Universal Law Publishing Co., New Delhi, 2000.

3. Lyman, M.D; Criminal Investigation – The Art & the Science, Prentice Hall, New Jersey, 2002.

4. O'Hara CE & Osterburg, JW; An Introduction to Criminalistics., Indiana University. Press, London, 1972.

5. Swansson,C.R, Chamelin, N.C, & Territ, L; Criminal Investigator, McGrawhill, New York, 2000.

6. The Indian Evidence Act,(1872), Amendment Act (2002); Universal Law Publishing Co., 2003.

7. The Code of Criminal Procedure (1973) Amendment Act, (2001); Universal Law Publishing Co., 2002.

8. Rattan Lal & Dhiraj Lal; The Indian Penal Code, 28th Ed. Wadhwa & Co. Nagpur, 2002.

Swami Vivekanand University, Sagar (M.P.)

Session: 2018-19

Class	**:**	**M.Sc.**
Semester	**:**	**IV Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**IV-(I-opt.)**
Paper Title	**:**	**Advanced Forensic Ballistics**
Subject Code	**:**	**MSCFSC-404**
Marks	**:**	**50**

Unit 1: Forensic Ballistics-I

History and background of Firearms, their classification and characteristics, various components of small arms, smooth bore and rifled firearm, different systems and their functions, rifling – various class characteristics, types of rifling and methods to produce rifling. Trigger and firing mechanism, cartridge-firing mechanism. Projectile velocity determination, Theory of recoil, methods for measurement of recoil. Techniques of dismantling/assembling of firearm. Types of ammunitions, classification and constructional features of different types of cartridges, types of primers and priming composition, propellants and their compositions, velocity and pressure characteristics under different conditions, various types of bullets and compositional aspects, latest trends in their manufacturing and design, smooth bore firearm projectile, identification of origin, improvised ammunition and safety. Identification of origin, improvised/ country- made/ imitative firearms and their constructional features.

Unit 2: Internal and External Ballistics

Definition, ignition of propellants, shape and size of propellants, manner of burning, various factors affecting the internal ballistics: lock time, ignition time, barrel time, erosion, corrosion and gas cutting, equation of motion of projectile, principal problems of exterior ballistics, vacuum trajectory, effect of air resistance on trajectory, base drag, yaw, shape of projectile and stability, trajectory computation, ballistics coefficient and limiting velocity, Ballistics tables, measurements of trajectory parameters, introduction to automated system of trajectory computation and automated management of ballistics data.

Unit 3: Terminal Ballistics

Effect of projectile on hitting the target: function of bullet shape, striking velocity, striking angle and nature of target, Tumbling of bullets, effect of instability of bullet, effect of intermediate targets, influence of range, Cavitation – temporary and permanent cavities, Ricochet and its effects, stopping power, Wound Ballistics; Threshold velocity for

penetration of skin/flesh/bones, preparation of gel block, penetration of projectiles in gel block and other targets, nature of wounds of entry, exit, initial track with various ranges and velocities with various types of projectiles, explosive wounds, 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.

Unit 4: Examination and identification

Firearms, ammunition and their components identification and examination, 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 lands and grooves, identification of various parts of firearms, techniques for obtaining test material from various types of weapons and their linkage with fired ammunition, class and individual characteristics, determination of range of fire-burning, scorching, blackening, tattooing and metal fouling, shots dispersion and GSR distribution, time of firing – different method employed, and their limitations, stereo & comparison microscopy, automatic bullet and cartridge comparison system.

Unit 5: GSR analysis

GSR analysis :Mechanism of formation of GSR, source and collection, spot test, chemical test, identification of shooter and instrumental methods of GSR Analysis, Management and reconstruction of crime scene; suicide, murder and accidental and self defence cases.

Practicals:

1. Identification of shell and pellets using vernier caliper and scew guage
2. Toidentify fired bullet and slug using vernier caliper
3. To examine various marks on cartridge and bullet using stereomicroscope
4. To collect and preserve gunshot residue from suspected hand.
5. Primary examination of gunshot residue by spot test.
6. demonstration of comparison microscope
7. Classification and designation of ammunition using physical measurements
8. Estimation of Range.
9. Determination of velocity and energy of projectiles

Suggested Readings

1. Sharma, B.R.; Firearms in Criminal Investigation & Trials, 4th Ed, Universal Law Publishing Co Pvt Ltd, New Delhi, 2011.

2. Mathews, J.H; Firearms Identification, Vol I, II and III, Charles C. Thomas, USA, 1977.

3. Hatcher, Jury and Weller; Firearms Investigation, Identification and Evidence, Stackpole Books, Harrisburg, Pennsylvania,1997.

4. Heard, B.J; Handbook of Firearms and Ballistics, John Wiley, England, 1997.

5. Warlow, T.A.; Firearms, The Law and Forensic Ballistics, Taylor and Francis, London,1996.
6. Schooeble, A.J. and Exline, L.D; Current methods in Forensic Gunshot Residue Analysis, CRC Press, New York, 2000.

7. Wilber; Ballistic Science for the Law Enforcement Officer, Charles C. Thomas, USA, 1977

8. Carlucci, D.E & Jacobson, S.S; Ballistics, CRC Press, London, 2008.

9. Sellier, K.G; Wound Ballistics and the Scientific Background, Elsevier Pub. Co., London, 1994.
10. Jauhari M; Identification of Firearms, Ammunition, & Firearms Injuries, BPR&D, New Delhi.

11. Ordog, G.J; Management of Gunshot wounds, Elsevier Pub. Co., New York, 1983.

12. Schooeble, A.J. and Exline, L.D; Current methods in Forensic Gunshot Residue Analysis, CRC Press, NewYork, 2000.

13. Beyer, J.C; Wound Ballistics, US. Printing Office, Washington, 1962.

14. Wilber; Ballistic Science for the Law Enforcement Officer, Charles C. Thomas, USA, 1977.
15. Di Maio, JM; Gunshot Wounds, CRC Press, New York, 1999.

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Session: 2018-19

Class	**:**	**M.Sc.**
Semester	**:**	**IV Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical –I**
Practical Paper Title	**:**	**Emerging Trends**
Subject Code	**:**	**MSCFSC-405**
Marks	**:**	**50**

Practicals:

1. To study the Structure of DNA and techniques used in DNA profiling
2. Techniques used in detection of deception
3. Basics of Computer hardware and accessories
4. Introduction to Operating system and their types
5. Biometrics in Face recognition
6. Individualization of a person from Lip Print
7. Identification of a person by Ridgeology
8. Identification of a person from IRIS and Retina
9. Basic principles and application of Geo-Forensics
10. To study the basics of Environmental Forensics
11. Concept of WMD
12. Study of CBRNE

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Session: 2018-19

Class	**:**	**M.Sc.**
Semester	**:**	**IV Sem.**
Subject	**:**	**Forensic Science**
Paper	**:**	**Practical –II**
Practical Paper Title	**:**	**Advance Forensic Ballistics**
Subject Code	**:**	**MSCFSC-406**
Marks	**:**	**50**

Practicals:

1. Identification of shell and pellets using vernier caliper and scew guage
2. Toidentify fired bullet and slug using vernier caliper
3. To examine various marks on cartridge and bullet using stereomicroscope
4. To collect and preserve gunshot residue from suspected hand.
5. Primary examination of gunshot residue by spot test.
6. demonstration of comparison microscope
7. Classification and designation of ammunition using physical measurements
8. Estimation of Range.
9. Determination of velocity and energy of projectiles