

S.S.JAIN SUBODH P.G. (Autonomous) COLLEGE JAIPUR
(Affiliated to University of Rajasthan)



Syllabus

SCHEME OF EXAMINATION AND COURSES OF STUDY

FACULTY OF SCIENCE

DEPARTMENT OF ZOOLOGY

P.G. DIPLOMA IN FORENSIC SCIENCE

M. Sc. I Year

Paper Code	Paper	Nomenclature	External / Theories	Internal / Theories	Total Mini. Marks	Total Max Marks
PGDFS 101	Paper I	Basics of Forensic Science & Crime Scene Management	70	30	40	100
PGDFS 102	Paper II	Instrumental Methods- Physical ,Biological & Chemical	70	30	40	100
PGDFS 103	Paper III	Forensic Biology and Serology	70	30	40	100
PGDFS 104	Paper IV	Forensic Science and Its Application in Crime Investigation	70	30	40	100
PGDFS 105	Paper V	Forensic Medicine & Legal Aspects of Forensic Science	70	30	40	100
Practical		Project Report	80	20	40	100

Paper I: Basics of Forensic Science & Crime Scene Management

Unit I

Forensic Science

Definition, Introduction , Basic Principles & Significance, History & Development of Forensic Science in India and World, Organizational Structure of Forensic Science laboratory, Different divisions and their field of work and units of Forensic Science Laboratory, Organizational Structure of Forensic Science teaching Institution.

Unit II

Crime & Criminal behaviour

Crime- Definition, Various types of crime
Criminal behaviour-cause and theories
Modus Operandi, Criminal profiling, Corpus Delicti.

Crime Scene Management

Defining the Scene of crime, Managing a crime scene & its hierarchy
Role of First Responding Officers
Search Patterns of a crime scene
Crime scene Documentation- Collection, Packaging, Labelling & Forwarding of exhibits to forensic laboratories.
Preservation of evidence
Health & Safety Protocols

UNIT III

Forensic Ethics- Introduction, Definition, Scope, Ethics in Forensic Science,

Professionalism and ethics: Importance of professional ethics, the importance Of professional ethics to science practitioners, development of code of conduct and code of ethics for Forensic Science; Application of codes and ethics, Ethical dilemmas and their resolution.

Paper II: Instrumental Methods- Physical, Biological & Chemical

Unit-I

Spectroscopic techniques: Introduction: Properties of light, Interaction of Matter and light, Electro-magnetic radiation & it's application in forensic science UV/Visible Spectrophotometry and it's application in Forensic Science, Molecular Fluorescence, Infrared (IR) Spectroscopy, & it's Application in Forensic Science, Raman Spectroscopy, Mass Spectrometry, Atomic Absorption Spectroscopy and it's applications in Forensic Science.

Chromatographic Techniques- Introduction, Principles, Theory, Instrumentations and Classification of chromatographic techniques and Forensic applications

Unit II

Microscopy: Basic principles of simple microscope, phase contrast microscope, stereoscopic microscopic and compound microscope, comparison microscope, polarizing microscope, fluorescent microscope, Electron Microscopy

Centrifugation Techniques: Basic principles of sedimentation, various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub- cellular fractions, Ultra- centrifuge- Refrigerated Centrifuges

Enzyme Techniques

Unit-III

Electrophoresis: Theory and General Principles, – Immuno-electrophoresis, Sodium dodecyl sulphate (SDS) polyacrylamide gel electrophoresis, Iso-electric focusing (IEF), Capillary Electrophoresis (CE), Forensic applications.

Immuno-chemical Technique

Electrochemical Techniques :

Coulometry, Polarography and Thermogravimetry: Introduction, Principles, Theory, Instrumentation, techniques and Forensic applications,
Molecular Biology Techniques

Paper-III : Forensic Biology and Serology

Unit – I

General consideration of Biological fluids

Blood- Blood and blood group systems. Detection and origin of Blood, Blood stain patterns, Disputed paternity and maternity.

Body Fluids- Forensic Application of Semen, Saliva, Urine, Faecal Matter, Milk, etc.

Unit –II

Brief knowledge of Human Skeleton. Fibers, Hair and Hides.

Forensic examination of biological fluids, stains and other materials.

Sexual offences, Impotence and Sterility, Virginity.

Personal Identification-

Sex determination, Age, Complexion and Features, Anthropometry and Dactylography, Foot Prints, Deformities, Scars, Tatoo marks, Occupation marks, Handwriting, Gait, DNA fingerprinting etc.

Unit III

DNA fingerprinting

Forensic Applications and Necessity of DNA fingerprinting.

Exhibits for DNA fingerprinting.

DNA extraction, Quantitation of isolated DNA (RT- PCR).

Amplification of STR by PCR, Electrophoresis by Genetic Analyzer.

Data interpretation.

Paper IV: Forensic Science and Its Application in Crime Investigation

Unit I

Crime Scene Evidences

- Blood, Semen & other Biological fluids
- Viscera
- Shoe impressions, Tool marks, Tyre marks
- Bite Marks
- Hair – Animal & Human, Fibres & Fabrics
- Glass, Soil, pollen, Paint

Establishment of identity of Individuals

- DNA Fingerprint
- Fingerprints/Foot prints
- Anthropology – Skeletal Remains
- Odontology
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Unit II

Questioned Document and Their Identification

- Identification of objects by shape and size
- Handwriting and signature-analysis, identification and examination
- Procedure for examination
- Types of forgery
- Anonymous letter
- Charred document
- Indented writing
- Counterfeit coins and notes
- Small coins (offence) Act 1971
- Standards of Weight and Measures Act 1976

Unit III

Chemical & Toxicological Analysis

- Drug Abuse & Narcotic drugs
- Toxicological examination of poisons & alcohol
- Toxicological examination of Viscera
- Petroleum Products
- Food Adulteration

Explosives

- Definition of Explosion & Detonation
- Country-made bombs & Improvised Explosive Devices (IEDs), Disposal & Handling

Fire Scene Investigation

- Cause of fire
- Analysis & Interpretation of fire scenes and seat of fire.
- Fire Dynamics
- Detection of Ignitable liquid residues in fire scenes
- Fire Debris Analysis & Analytical Methods for detection & characterisation

Paper V: Forensic Medicine & Legal Aspects of Forensic Science

Unit I

Medical Jurisprudence

Brief History & current scenario at National & International level

Forwarding of Biological samples to Forensic Laboratories

Medico legal aspect of Death

Concept of Human Anatomy & Physiology

Time of Death

Causes of Death

Injuries: classification, forms and medico legal aspects

Medico Legal Aspects – PM report, Dying Declaration & Expert Testimony (Evidence Act)

Sexual Offences - Rape, DFSA (Drug Facilitated Sexual Assault)

- Examination of the victim & the accused
- Collection of evidence

Infanticide, Abortion, Artificial Insemination

Medical Termination of Pregnancy Act 1971

Prenatal Diagnostic Technique Act 1984

UNIT-II

Definition of Law, Court, Judge, Crime and Criminal, Basic Terminology in Law,

History and Introduction to Indian Penal Code

History and Introduction to Criminal Procedure Code

Introduction of Evidence Act

Common Object, Common Intention, General Exception (Section 76-95), Right of Private Defense, (Section 96 to Section 106) brief introduction to offences affecting Human life and Property.

FIR, Expert Opinion. Case Studies regarding various crimes

UNIT III

Narcotic Drugs and Psychotropic Substances Act, Drugs and Cosmetics Acts, Explosive Substances Acts, Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act, Wild Life Protection Act, I.T. Act (Information Technology Act)-2000.

Practicals :

1. General comparison of Paints, Soils and Glass.
2. Sole prints comparison and their lifting from the scene of crime.
3. Separation of pesticides/insecticides (TLC) & Identification using chromomeric reagents
4. Estimation of alcohol in Blood.
5. Microscopic Identification of plant poisons.
6. Analysis of viscera and food material for in case of food poisoning by chemical and instrumental techniques
7. Collection and preservation of biological material like Blood ,Saliva ,Semen. Hair, Nails,Human skeleton (Bones),Hide and covers, Foetus and Tissue.
8. To determine origin of blood.
9. To determine blood group from fresh blood, blood stains and body fluids.
10. To identify blood stains.
11. Comparative analysis of Diatoms.
12. To prepare gel plates for electrophoresis.
13. Examination of footprint/footwearprint/tyre impressions
14. Fingerprint development on various surfaces
15. Handwriting identification based on class characteristics and individual characteristics
16. Microscopic examination of Hair, Fibre, Pollen, diatoms
17. Examination of various biological samples- Blood, Saliva, Semen, Urine
18. Demonstration and quantitative use of analytical instruments in crime investigation.
HPLC, GC-MS, UV- Spectrophotometer
19. Chromatography: Paper, TLC
20. Demonstration of Automated isolation of DNA
21. Demonstration of PCR and RT-PCR
22. Electrophoresis by Genetic Analyser
23. Reconstruction and evaluation of scene of crime (Murder, Arson and Shooting cases etc.).
24. Sketching and photography of scene of crime.
25. Collection and packing of physical clues at the scene of crime.
26. Document and Finger print Photography.

Suggested Readings:

1. Nanda, B.B. and Tewari, R.K. (2001) Forensic Science in India: A vision for the twenty first century Select Publisher, New Delhi.
2. James, S.H and Nordby, J.J. (2003) Forensic Science: An introduction to scientific and investigative techniques CRC Press,
3. Saferstein : Criminalistics (1976) Prentice Hall Inc., USA.
4. Deforest, Gansellen & Lee : Introduction to Criminalistics.
5. Sharma, B.R. (1974) Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad,1974.
6. Hess, A.K. and Weiner, I.B. (1999) Handbook of Forensic Psychology 2nd Ed. John wiley & sons.
7. Bruce A. Arrigo (2000) Introduction to Forensic Psychology Academic Press, London
8. J A Siegel, P.J Saukko (2000) Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press
9. Hand Book of Forensic Psychology – O' Donohue Levensky
10. Criminal Profiling – B.Turvey
11. Investigative Forensic Hypnosis – J. Niehans
12. Hand Book of Polygraph Testing – M.Kloinen
13. Detecting Lies & Deceit – A.Vrij
14. Virginia A. Lynch (2011) and Janet Barber Duval: Forensic Nursing Science.
15. Borrow (1980) Molecular Spectroscopy.
16. Willdard, H. H (1974) Instrumental Methods of Analysis.
17. Moonesens A.A. (1979) Scientific Evidence in Criminal Cases.
18. Lundquist & Curry (1963) Methods of Forensic Science.
19. E. Stahl (1969) Thin Layer Chromatography: A Laboratory Handbook.
20. Sue Jickells and Adam Negrusz (2008) Clarke's Analytical Forensic Toxicology.
21. Forensic Chemistry: Max M Houck (2015)
22. N. Gilbert (1993) Criminal Investigation; Third edition, Macmillan Publishing company.
23. Bernard Robertson and G.A. Vignaur (1995) Interpreting evidence John Wiley and Sons Ltd.
24. Sharma, B.R. (1974) Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad
25. The Hand Book of Forensic Psychology – Weiner Hass
26. Hand Book of Forensic Psychology – O' Donohue Levensky
27. Howard MATHEWS; Charles C. Thomas, Firearms identification, vols. 1,2 & 3; Springfield, Illinois; (1973)
28. Hatcher, Jury and Weller: Firearms Investigation, Identification and Evidence; Stackpole Books, Harrisburg, PA; (1977)
29. Vincent Di Maio, Gunshot Wounds; CRC press, Washington, DC; (1999)
30. Brain J. Heard; Handbook of Firearms and Ballistics; Jhon Willey, England; (1997)
31. Warlow; Firearms, The Law and Forensic Ballistics; Taylor& Francis, Lo (1996)

32. Karl G. Sellier et al; Wound Ballistics and the scientific Background; Elsevier, London; (1994)