S.S. JAIN SUBODH P.G. COLLEGE, JAIPUR
(AN AUTONOMOUS INSTITUTION)

Syllabus

SCHEME OF EXAMINATION AND COURSES OF STUDY FACULTY OF SCIENCE

DEPARTMENT OF FORENSIC SCIENCE

M.Sc. Forensic Science

Semester- I, II, III and IV

Rambagh Circle Jaipur-302004, Rajasthan (INDIA)
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Contents:

Objective: Our mission as a Forensic science program is to develop professional, ethical post graduates whose competence in problem-solving, legal analysis and application, quantitative reasoning, investigation and scientific laboratory procedures can be applied to immediate employment or advanced study.

Programme specific objectives:

- To develop the Post graduate level students with the specific knowledge of handling different types of evidences and their examinations.
- To develop the laboratory skills in examining different types of evidences found at the crime scene.
- To prepare the students to compete for employment in State and central level Organizations.

Eligibility:

A candidate who has secured more than 55% in the Bachelor degree in Life Science/ Forensic Science or equivalent graduate degreeshall be eligible for admission to First Semester of a Master of Forensic Science. For candidates from outside state of Rajasthan 60% will be applicable irrespective of the category.

Scheme of Examination:

1. Each theory paper carries 100 marks. The internal assessment will be 30 marks and EoSE shall carry 70 marks. The EoSE will be of 3 hours duration. There will be a practical examination of 200 marks in all Semester.

2. There will be two parts in EoSE theory paper. Part A of theory paper shall contain 10 Short Answer Questions of 14 marks, based on knowledge, understanding and applications of the topics/texts covered in the syllabus. Candidate has to attempt seven questions out of 10 and each question will carry two marks for correct answer.

3. Parts —B of EoSE theory paper will consisting of four questions from each unit with Internal choice of 14 marks each. The limit of answer will be five pages.

4. Each Laboratory EoSE will be of four hour durations and involve laboratory experiments/exercises/ Seminar presentation / Synopsis presentation/Project work or field study / Industrial Training/ consultancy training and viva-voce examination consisting of 200 Marks.

5. The aim of Project work/ Forensic Laboratories/ field study /Research laboratories/ Hospital training is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject.

The primary objective of undertaking project work, forensic laboratory work, field studies, research laboratory work, or hospital training is to familiarize students with research methodology relevant to their subject. This experience is intended to prepare students for advanced study or research in theoretical, experimental, or computational domains.The project work is to be undertaken under guidance jointly by Head of the Department and a senior faculty or a Scientist or any other suitable person with proven research excellence in the concerned field of study. The project work, forensic laboratory work, field studies, research laboratory work, or hospital training can also be taken up in an outside institution of repute Department. The guide will make continuous internal assessment of the Project work and seminar will be held at department of the college by a board of three examiners consisting of HOD, two senior faculty of the department or expert from interdisciplinary department of the institution.

6. Supplementary/ due paper/ special examinations will be resolute as per the institutions autonomous rules.

7. Grade/CGPA/percentage/division will be decided as per the autonomous guidelines of the institution.

Semester I

Paper Code	Nomenclature	Credits	Marks		Total Marks
			External	Internal	
PGFS S1P1	**Fundamentals of Forensic Science**	4	70	30	100
PGFS S1P2	**Forensic Criminology**	4	70	30	100
PGFS S1P3	**Analytical Instrumental Techniques in Forensics**	4	70	30	100
PGFS S1P4	**Advanced Forensic Toxicology**	4	70	30	100
PGFS S1LC1	**Forensic Lab Course-I& Seminar**	8	60	40	200
PGFS S1LC2	**Forensic Lab Course-II & Minor Project**		60	40	

Semester II

Paper Code	Nomenclature	Credits	Marks		Total Marks
			External	Internal	
PGFS S2P1	**Forensic Biological Sciences**	4	70	30	100
PGFS S2P2	**Questioned Document**	4	70	30	100
PGFS S2P3	**Finger print and Impressions**	4	70	30	100
PGFS S2P4	**Basic concepts of Digital Forensics**	4	70	30	100
PGFS S2LC1	**Forensic Lab Course-III& Seminar**	8	60	40	200
PGFS S2LC2	**Forensic Lab Course-IV& Minor Project**		60	40	

Semester III

Paper Code	Nomenclature	Credits	Marks External	Marks Internal	Total Marks
PGFSC S3P1 (Core Paper)	**Forensic Ballistics & Photography**	4	70	30	100
PGFSC S3P2 (Core Paper)	**Crime Scene Management and Forensic Evidences**	4	70	30	100
Specialization I Forensic Biology, Serology and DNA Finger Printing					
PGFSS1 E3PI	**Elective Paper I**	4	70	30	100
PGFSS1 E3P2	**Elective Paper II**	4	70	30	100
Specialization II Forensic Toxicology					
PGFSS2 E3PI	**Elective Paper I**	4	70	30	100
PGFSS2 E3P2	**Elective Paper II**	4	70	30	100
Specialization III Cyber and Digital Forensics					
PGFSS3 E3PI	**Elective Paper I**	4	70	30	100
PGFSS3 E3P2	**Elective Paper II**	4	70	30	100
PGFS S1LC1	**Forensic Lab Course-V& Seminar**	8	60	40	200
PGFSS1LC2	**Forensic Lab Course-VI& Minor Project**		60	40	

Semester IV

Paper Code	Nomenclature	Credits	Marks External	Marks Internal	Total Marks
PGFS S4P1 (Core Paper)	**Forensic Medicine**	4	70	30	100
PGFS S4P2 (Core Paper)	**Forensic Entomology**	4	70	30	100
Specialization I Forensic Biology, Serology and DNA Finger Printing					
PGFSS1E4P I	**Elective Paper I**	4	70	30	100

PGFSS1E4P 2	**Elective Paper II**	4	70	30	100
Specialization II Forensic Toxicology					
PGFS E4P I	**Elective Paper I**	4	70	30	100
PGFS E4P 2	**Elective Paper II**	4	70	30	100
Specialization III Cyber and Digital Forensics					
PGFS E4P I	**Elective Paper I**	4	70	30	100
PGFS E4P 2	**Elective Paper II**	4	70	30	100
PGFS S1LC1	**Forensic Lab Course VII& Seminar**	8	60	40	200
PGFS S1LC2	**Forensic Lab Course VIII Dissertation**		60	40	

SpecializationOffered

	Specializations
Specialization I	**Forensic Biology, Serology and DNA Finger Printing**
Specialization II	**Forensic Toxicology**
Specialization III	**Cyber and Digital Forensics**

M. Sc. Forensic Science Semester- I

THEORY

Paper I

PGFS S1P1: Fundamentals of Forensic Science

Duration: 3 hrs. **Max. Marks: 70**

Note: There will be two parts in end semester theory paper. Part A of the paper shall contain 7 short answer questions of 14 marks. Each question will carry two marks Part B of the paper will consist of four questions, one question from each unit with internal choice. Each question will carry 14 marks.

Unit-1 Introduction to Forensic Science

Definition of Forensic Science, History and Development of Forensic Science Basic principles of forensic science, Branches of forensic science, Multidisciplinary nature, Forensic Psychology and investigative techniques,Forensic Technology solving crimes with advanced technology, Forensic Evidences: Concise of Forensic Physical, Biological, Chemical and Psychological evidences

Laws and Principles of Forensic Science: Law of Exchange, Law of Individuality, Law of Comparison, Law of Progressive Changes and Law of Probability

Unit-II

Organizational SetupOrganizational structure of Forensic Science Laboratories at State and Central level, FPB, NICFS, CDTS (Central Detective Training School), NCRBQualifications and duties of Forensic Scientists Academic centres of education and research, Indian and Academy of Forensic Science, Interpol and FBI, Research fields in Forensic Science

Unit-III

Police and Forensic Science: Relationship between police and forensic expert, Role of Police at the Crime scene, scientific help at crime scene, forensic case documentation by Police, Technological Advance and Police. Frye and Daubert standards, Ethics in Forensic Science.

Unit-IV

Environmental Forensics: Definition, Legal processes involving environmental forensic science. Basic principles and its applications

Biometrics in Personal Identification: Introduction, Concepts of Biometric Authentication and its role in person Identification

SUGGESTED READING:

1. Houck, M.M & Siegel, J.A; Fundamentals of Forensic Science, Acadamic Press, London, 2006.

2. Sharma, B.R; Forensic Science in Criminal Investigation & Trials, Universal Publishing Co., New Delhi, 2003

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. James, S.H and Nordby, J.J; Forensic Science- An Introduction to Scientific and Investigative Techniques, CRC Press, USA, 2003.

5. Saferstein; Criminalistics- An Introduction of Forensic Science, Prentice Hall Inc, USA,2007.

6. Barry, A.J. Fisher; Techniques of Crime Scene Investigation, 7th Ed, CRC Press, NewYork, 2003.

7. Mordby, J. & Reckoning, D; The Art of Forensic Detection, CRC Press NewYork, 2003.

THEORY

Paper II

PGFS S1P2: Forensic Criminology

Duration: 3 hrs. **Max. Marks: 70**

Note: There will be two parts in end semester theory paper. Part A of the paper shall contain 7 short answer questions of 14 marks. Each question will carry two marks Part B of the paper will consist of four questions, one question from each unit with internal choice. Each question will carry 14 marks.

Unit -I

Introduction to crime, Concept and Definition of Crime, Types of crime and its causes: Property crimes, public order crimes, violent crimes, cyber crimes, juvenile delinquency, Society-Criminal interaction and various types of crimes in India.

Unit- II

Introduction of Forensic Criminology, Control and Prevention of Crime, Criminal Profiling: Definition, Need and Types, theories of criminology (differential association theory, self-concept and containment theory, labelling theory, barrier theory, etc.), punitive aspects (theories of Punishment), probation & parole

Unit -III

Investigation: FIR, Case diaries, types of complaints, cognizable and non-cognizable offences, police custody &Judicial custody, Bailable and non bailable offences, Procedure of filing charge sheet.Constitution of Courts and their Powers. LokAdalats, LokAyukts and Juvenile Courts. Fundamental Rights

Unit -IV

Forensic Expert: Definition and related Laws & Issues, Expert Witness, Indian EvidenceIT Act, BhartiyaSakshyaAdhiniyam (IEA), BhartiyaNagarikSurakshaSanhita (Cr PC), POCSO

SUGGESTED READING:

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&DhirajLal; The Indian Penal Code, 28th Ed. Wadhwa& Co. Nagpur, 2002.

THEORY

Paper III

PGFS S1P3: Analytical Instrumental Techniques in Forensics

Duration: 3 hrs. **Max. Marks: 70**

Note: There will be two parts in end semester theory paper. Part A of the paper shall contain 7 short answer questions of 14 marks. Each question will carry two marks Part B of the paper will consist of four questions, one question from each unit with internal choice. Each question will carry 14 marks.

Unit –I

Microscopy- Basic principles, Simple and Compound microscope, Comparison microscope, Phase contrast Microscope, Phase contrast Microscope, Stereoscopic microscope, Fluorescent Microscopy, Infra-red Microscopy, Scanning Electron Microscope (SEM) & Transmission Electron Microscope (TEM).Chromatographic Techniques- Basic principles, theory and instrumentation Electrophoretic Technique- Basic principles, theory and instrumentation

Unit-II

Introduction to UV- Visible spectrophotometry, qualitative and quantitative methods for detection. Fluorescence spectrophotometry, Types of sources, instrumentation, Atomic absorption spectroscopy: Instrumentation and techniques, Atomic emission spectroscopy Instrumentation and techniques qualitative analysis and application.

Unit -III

Mass Spectrometry Sample flow, Ionization methods, Mass analyzer, Vacuum systems, data handling correlation of mass spectra and molecular structure, Fourier transform mass spectrometry,GCMS, LCMS, Inductively coupled plasma MS (ICP-MS), High performance liquid chromatography

Unit-IV

Raman spectroscopy: Instrumentation, sample handling and illumination, structural analysis, Introduction to X-ray absorption and fluorescence methods X-ray diffraction, Nuclear magnetic resonance spectroscopy: Basic principles, theory and instrumentation.

SUGGESTED READING:

1. Robinson, J.W; Atomic Spectroscopy, 2nd Ed. Revised & Expanded, Marcel Dekkar, Inc,New York, 1996.

2. Workman, J; Art Springsteen; Applied Spectroscopy- A compact reference for Practitioners, Academic Press, London, 1997.

3. Subrahmanyam, N. &Lal B; A text Book of Optics, S. Chand & Company, New Delhi, 2004.

4. Willard, H.H. Lynne L. Merrett, J. Dean, A. Frank, A. Settle. J; Instrumental Methods of Analysis, 7th Edn.CBS pub.& Distributors, New Delhi, 1986.

5. Khandpur, R.S; Handbook of Analytical Instruments, Tata McGraw Hill Pub. Co.New Delhi, 2004.

6. Thomson, K.C. &Renolds, R.J; Atomic Absorption Fluorescence & Flame Emission Spectroscopy, A Practical Approach, 2nd Edn. Charles Griffith & Company, New SouthWales, 1978.

7. Dudley, H. Williams & Fleming, I; Spectroscopic Methods in Organic Chemistry, 4thEdn, Tata McGraw- Hill Publishing Company, New Delhi, 1994.

THEORY

Paper IV

PGFS S1P4:Advanced Forensic Toxicology

Duration: 3 hrs. **Max. Marks: 70**

Note: There will be two parts in end semester theory paper. Part A of the paper shall contain 7 short answer questions of 14 marks. Each question will carry two marks Part B of the paper will consist of four questions, one question from each unit with internal choice. Each question will carry 14 marks.

Unit-I

Introduction, History International organization related to Forensic Toxicology, Different mode of Classification of Poisons, Areas of Forensic Toxicology, Elements of Forensic Toxicology, Applications, Scientific Principles, Instrumentation and equipments Forensic Veterinary Toxicology: Definition, cases, common animal disease states affecting small animals and large animals, Legal and regulatory issues

Unit-II

Entomo-toxicology: Definition and Forensic utility, Environmental Forensic Toxicology, Introduction, principles and application, environmental data, ground water characterization, soil, vapour survey, analytical methods. Forensic techniques in environmental litigation. Ptomaine: Introduction, interference caused in analysis of poison, especially in putrefied viscera, poisoning cases due to ptomaine.

Unit III

Clinical Toxicology: Introduction and history of clinical toxicology y, Toxidrome, Laboratory principles, Pharmacokinetics and Toxicokinetics overview, Administration, liberation, and absorption of toxicants, Prevention of absorption from the gastrointestinal tract, Distribution and Metabolism of Toxicants in the body, Elimination of toxicants, Enhancement of elimination of toxicants, Types of Antidotes

Unit-IV

Analysis of Poisons, Method of analysis of Basic drugs / poisons, Method of analysis of Acidic drugs / poisons, Method of analysis of metallic poisons and volatile poisons, Analysis of samples taken under Food Adulteration Act, Toxicological analysis of decomposed materials.

SUGGESTED READING:

1. Modi's (1988) Medical Jurisprudence & Toxicology, M. M. Trirathi Press Ltd. Allahabd,.

2. Saferstein, R (1982) Forensic Science Hand Book, Vol I, II and III, Pretince Hall, NI.

3. Saferstein, R (2000) Criminalistics.

4. Curry (1986) Analytical Methods in Human Toxicology, Part II.

5. Curry, A.S. (1976) Poison Detection in Human Organs.

6. E. Stahl (1969) Thin Layer Chromatography: A Laboratory Handbook.

M. Sc. Forensic Science Semester- I

PRACTICALS

Paper Code: PGFS S1LC1

Forensic Lab Course-I

- Ethics in Forensic Lab
- Crime Scene Documentation
- Psychological analysis in Forensics
- To obtain Plain and rolled inked finger prints.
- To identify the finger Print Patterns.
- To perform Ridge tracing and Ridge counting.
- To identify the Ridge characteristics (Minutia).
- To compare the finger Prints.
- Biometric Authentication in Forensics
- To develop latent finger Prints with powdering/ fuming / chemical method.

M. Sc. Forensic Science Semester- I

PRACTICALS

Paper Code: PGFS S1LC1

Forensic Lab Course-II

- Preparation of buffers and standard solutions.
- Separation of mixture using centrifugation.
- Identification of compounds UV-VIS spectrophotometer
- Concepts and working GC, GC-MS and HPLC
- Paper chromatography: one-dimensional chromatography using amino acids from purified samples and biological materials.
- PAGE electrophoresis, determination of serum protein through PAGE
- Principal and Working of PCR
- Spectrophotometry: Principal, Instrumentation and Application
- Microscopic examination of forensic evidences (Blood, Semen , Hair, Fibre, Glass, Wool and related biological sample)
- Application of Phase Contrast Microscopy in Forensics.
- Models of study drug metabolism and their application.
- Application of Entomo-toxicology in relation to Forensics