

**M. D. UNIVERSITY ROHTAK  
DEPARTMENT OF GENETICS**

**Ph.D. Course Work in Forensic Science w.e.f. 2015-16  
Scheme of Examination**

<b>Paper No.</b>	<b>Nomenclature of the Paper</b>	<b>Internal Assessment</b>	<b>Theory</b>	<b>Seminar (if any)</b>	<b>Max. Marks</b>
FS:P01	Research Methodology	20	80	--	100
FS:P02	Statistics Analysis & Computers	20	80	--	100
FS:P03	Techniques in Forensic Science	20	80	--	100
FS:P04	Review writing and presentation/Seminar	--	50	50	100

**PROGRAM SPECIFIC OUTCOMES**

**Ph.D. Course work in M.Sc. Forensic Science is designed to meet out the following program specific outcome:**

- PSO-1:** Student would be able to describe role of various Research methodologies & Research funding agencies in Forensic Science.
- PSO-2:** Students will be able to use various Statistics methods of Analysis in research and also basic of Computers in research development.
- PSO-3:** They would be able to explore different fields available for research in forensic science.
- PSO-4:** They would have a broader understanding of instruments like UV-vis Spectrophotometer, FT-IR, GC-MS, HPLC, PCR, Gel/SDS etc.
- PSO-5:** They would be able to better enhance their communication and presentation skills by giving seminar and report writing.
- PSO-6:** They would acquire an enhanced aptitude for being a better researcher and would gather related literature for their future research work.

## SYLLABUS FOR Ph.D. COURSE WORK IN FORENSIC SCIENCE

<b>Research Methodology</b>		
<b>Core Code: FS: P01</b>	<b>Max. Marks: 80</b>	<b>Time: 3 Hours</b>
<p><b><u>Course Outcomes:</u></b></p> <p><b>CO-1:</b> Students would be able to understand Purpose, Characteristics and Types of Research in forensic science.</p> <p><b>CO-2:</b> They would be able to know about different funding agencies of India aiding forensic research work.</p> <p><b>CO-3:</b> They would know about Ethical, legal, social and scientific issues in Forensic research.</p> <p><b>CO-4:</b> They would be able to write research proposals.</p> <p><b>CO-5:</b> Students would be able gain the basic knowledge of organizing conferences, symposia, workshop, exhibition etc and their role in research enhancement.</p>		
<b><u>Instructions</u></b>		
<p>The question paper will consist of five sections A, B, C, D and E. Section A, B, C and D will have two questions from the respective sections of the syllabus carrying equal marks. Section E will consist of ten short answer type questions which will cover the entire syllabus uniformly. Short answer type questions (not more than five lines or fifty words) shall carry two marks each.</p>		
<b>UNIT-A</b>		
<p>Meaning of Research in Forensic Sciences - Purpose, Characteristics and Types of Research - Process of Research -Formulation of objectives - Formulation of Hypotheses - Types of Hypotheses - Methods of testing Hypotheses - Research plan and its components - Methods of Research (Survey, Observation, case study, experimental, historical and comparative methods) - Difficulties in Forensic Biological, Forensic Chemical, Forensic Physical and Computer forensic research.</p>		
<b>UNIT-B</b>		
<p>Identification and formation of research problem (Hypothesis). Elements in research methodology: Research design (CRD, RBD, and LSD). Scientific database: Science Direct and Pubmed.</p>		
<b>UNIT-C</b>		
<p>Ethical, legal, social and scientific issues in Forensic research. A brief idea about the funding agencies such as DSF, DST, DBT, ICMR, CSIR and UGC. Role of IPR in Research and Development.</p>		
<b>UNIT-D</b>		
<p>Writing of Research Proposal, Report and Research Paper: Meaning and types -Stages in preparation - Characteristics - Structure - Documentation: Footnotes and Bibliography - Editing the final draft-Evaluating the final draft- Checklist for a good proposal/report/research paper. Basic knowledge of organizing conferences, symposia, workshop, exhibition etc.</p>		

**Suggested Books:**

- 1) Research Methodology- G.R. Basotia and K.K. Sharma.
- 2) Research Methodology- C.H. Chaudhary, RBSA Publication

## Statistic Analysis & Computers

**Core Code: FS: P02**

**Max. Marks: 80**

**Time: 3 Hours**

### Course Outcomes:

**CO-1:** Students would be able to understand importance of various statistical methods in research analysis.

**CO-2:** They would understand Tests of hypothesis in research work.

**CO-3:** They would have broader knowledge of attributes, Z-test and probability etc.

**CO-4:** They would be able to interpret statistical data.

**CO-5:** They would be able to gain basic knowledge of computer and various software's used in scientific research.

### Instructions

The question paper will consist of five sections A, B, C, D and E. Section A, B, C and D will have two questions from the respective sections of the syllabus carrying equal marks. Section E will consist of ten short answer type questions which will cover the entire syllabus uniformly. Short answer type questions (not more than five lines or fifty words) shall carry two marks each.

### UNIT-A

**Types of Data:** Basic concepts of frequency distribution, Measure of central values-Mean, median and mode, Measures of dispersion, range, mean deviation and standard deviation  
Correlation and Regression analysis

**Probability:** Theory, Classical definition of Probability, Basic terms – Events, Trails, Mutually exclusive events, Favourable events, Exhaustive events etc, Baye's Theorems of probability, Addition Theorem, Multiplication Theorem, Conditional Probability & Coincidence Probabilities.

### UNIT-B

**Variance** – Coefficient of Variation, Moment, Skewness and kurtosis, binomial, distribution, Normal distribution, hyper geometric distribution, correlated Measurements.  
**Discriminating power** – Derivation, evaluation of evidence by discriminating powers  
Combination of independent systems, correlated attributes, Transfer of evidence – likelihood ratio, probability of guilt correspondence probabilities, direction of transfer

### UNIT-C

**Tests of hypothesis** – Tests of significant of attributes, Z-test of significance and coefficient of correlation, Small sample test, T-test, Paired Test, Chi-square test, F test of equality of variance, Large sample test, Normal test.

### UNIT-D

**Computer and Internet basics;** Introduction and need of Computers, Operating system and basics of Windows, User Interface, File management, File Transfer (ftp, WSftp), DOS, UNIX, Difference between presentation and document, introduction to Notepad, MS-Office word, MS-Excel, Power Point, Opening Documents and Closing documents, introduction to Paint and Photoshop. Computer Communication and Internet, Electronic mails, Communication on Internet, Surfing the Internet,

### **Suggested Books:**

- 1) Elements of Biostatistics in Health Science- W. Daniell.
- 2) Statistical Methods for Research: S. Singh et al (1988) Central Publishing Ludhiana.

- 3) Fundamental of Statistics – D. N. Enhance.
- 4) Statistical Methods: S.P. Gupta. S. Chand Publication
- 5) Fundamentals of Biostatistics- Khan and Khanna, Ukaz Publication
- 6) Biostatistical analysis- Zerold and Jar.
- 7) C.S. French "Data Processing and Information Technology", BPB Publications 1998
- 8) Publications 1998
- 9) P.K Sinha `Computer Fundamentals`, BPB Publications, 1992

<b>Techniques in Forensic Science</b>		
<b>Core Code: FS: P03</b>	<b>Max. Marks: 80</b>	<b>Time: 3 Hours</b>
<p><b>Course Outcomes:</b></p> <p><b>CO-1:</b> Students would be able to understand importance of research in Forensic science.</p> <p><b>CO-2:</b> They would understand techniques used in forensic chemical sciences;</p> <p><b>CO-3:</b> They would have broader knowledge of forensic biological methods and techniques.</p> <p><b>CO-4:</b> They would be able to gain knowledge of research in forensic physical sciences.</p> <p><b>CO-5:</b> They would acquire a better understanding of lacunae in forensic research.</p>		
<b>Instructions</b>		
<p>The question paper will consist of five sections A, B, C, D and E. Section A, B, C and D will have two questions from the respective sections of the syllabus carrying equal marks. Section E will consist of ten short answer type questions which will cover the entire syllabus uniformly. Short answer type questions (not more than five lines or fifty words) shall carry two marks each.</p>		
<b>UNIT-A - (Introduction to Forensic Science)</b>		
<p>Forensic Science Laboratories, Need and Scope of Forensic Science, Basic Principles of Forensic Science, Branches of Forensic science, and Future research perspectives in Forensic Science</p>		
<b>UNIT- B – (Advanced Forensic Chemical Techniques)</b>		
<p>Need of chemical analysis in Forensic investigations, Brief Introduction to Chromatographic techniques: TLC, HPTLC and GC techniques, with special reference to qualitative and quantitative analysis. Brief Introduction to Spectroscopic techniques: Overview and Forensic applications of UV-VIS and FTIR, Forensic Applications: Mass Spectrometry, AAS and X-ray techniques in forensic analysis</p>		
<b>UNIT-C - (Advanced Forensic Biological Techniques)</b>		
<p>Need of biological analysis on Forensic Science, Electrophoretic Techniques: Theory, General Principles and Forensic applications. DNA Fingerprinting Techniques: RT-PCR and RFLP, PCR, AFLP-PCR, Combined DNA Index System (CODIS).</p>		
<b>UNIT-D – (Advanced Forensic Physical Techniques)</b>		
<p>Role of Microscopy in Forensic Science Investigation: Light and Scanning Microscopes, Comparison Microscopy, Profiling and Automated Finger print Identification Systems (AFIS), Video spectral comparator (VSC), Introduction to NIBIN and IBIS, Advanced Computer and Cyber forensic tools, Forensic Psychological techniques and their legal prospectus, methods of Criminal</p>		

**Suggested Books:**

- 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) Saferstein : Handbook of Forensic Science (Vol-I to III), 1976, Prentice Hall Inc.,USA.
- 3) Sharma, B.R. : Forensic Science in Criminal Investigaion and Trials, Central Law Agency, Allahabad, 1974.
- 4) Lee & Gaensslen : Advances in Forensic Science, (Vol. 2) Instrumental Analysis.
- 5) Settle,F.A.: Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall, 1997.
- 6) Ellen, D (1997) : The scientific examination of Documents, Methods and techniques. 2nd ed., Taylor & Francis Ltd.
- 7) Willard (1986) Instrumental Methods of Analysis, CBS Publishers & Distributors.

<b>Review writing and Presentation/Seminar</b>		
<b>Core Code: FS: P04</b>	<b>Max. Marks: 80</b>	<b>Time: 3 Hours</b>
<b><u>Course Outcomes:</u></b> <b>CO-1:</b> Students would be able to enhance their skill for research presentation. <b>CO-2:</b> They would be able to be better communicator. <b>CO-3:</b> They would have broader knowledge of report writing. <b>CO-4:</b> They would be able to better compile seminar for presentation <b>CO-5:</b> They would be able to publish their research work at preliminary stage.		