01. Name of the Department: Forensic Sciences						
02. Course Name	**Criminology & Police Administration**			**L**	**T**	**P**
03. Course Code	**17100101**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (*)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:**Understand the basics of Forensic science and its development in India. **CO2:** Know the various types of crimes and its scenario in India. **CO3**: Understand the basic theories of criminology and its behavior. **CO4:** Know about the police Administration and related laws.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Criminology and criminal Behavior**				
Aim and scope of criminology; Criminal behavior and various theories of criminal behavior: classic theory, positivist theory, sociological aspect in society, Criminal behavior, Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media. Monitoring system insociety.						
Unit – 2	**Number of lectures = 7**	**Title of the unit: Crime and its Scenario in India**				
Introduction to crime, Definition,conceptandscopeofcrime.TypesofcrimesCauses and effects of crimes. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence. White collar crimes. Controlandprevention of crime.Crime scenario in India. Detection of Crime, Different agencies involved incrime detection.						
Unit – 3	**Number of lectures = 7**	**Title of the unit:Criminal Justice System**				
Broad components of criminal justice system. Role of Police in Criminal Justice System. Police's power of investigation. Filing of criminal charges. Community policing. Correctional measures and rehabilitation of offenders. Human rights and criminal justice system in India.						
Unit – 4	**Number of lectures = 7**	**Title of the unit: Police Administration& Law**				
Indian Penal Code: sections-23, 24, 25,39,44,52,76-79,84-86.Police, Medico-legal expert, Judicial officers Criminal Procedure Code: sections-2, 6-35, 41-60, 61-90,154-176, 293, 294. Charges: bail able/non-bailableoffences,cognizable/non-cognizable,summoncaseandwarrantcases. IndianEvidenceAct:sections-3,24-30,45,135-138,141.Experttestimony.						

11. Brief Description of self learning / E-learning component

https://www.youtube.com/watch?v=nNvy7_73ecc
https://www.youtube.com/watch?v=MV4DAuR1O1M
https://epgp.inflibnet.ac.in/ahl.php?csrno=16
https://drive.google.com/file/d/122C9NaIYt5xamwKhiUa2X_tJCvR3x6vE/view
http://www.forensicpage.com/new10.htm

12. Books Recommended

1. Houck, M.M & Siegel, J.A; Fundamentals of Forensic Science, Academic 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. Nordby, J. & Reckoning, D; The Art of Forensic Detection, CRC Press NewYork, 2003.
8. Robertson and Vignaux; Interpreting Evidence, John Wiley, New York.
9. IPC
10. CrPC
11. IEA

01. Name of the Department: Forensic Sciences						
02. Course Name	**Forensic Dermatoglyphics and other Impressions**			**L**	**T**	**P**
03. Course Code	**17100102**			2	0	0
04. Type of Course (use tick mark)		**Core ()**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (*)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1**: Different instrumental techniques that use in fingerprint examinations. **CO2**: Understand the Individual identification from fingerprint and they can use in the crime investigation. **CO3:** Know theSignificance of foot, palm, ear and lip prints. **CO4:** Develop latent fingerprints on crime scene.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Basics of Fingerprints**				
HistoryanddevelopmentofDermatoglyphics,formationofridges, Composition of sweat,patterntypes,patternarea. Classification of fingerprints- Henry's system of classification, single-digit classification, Extension of Henry's classification, filing, searching and fingerprint bureau. Automated Fingerprint Identification System. Significance of poroscopy and edgeoscopy.						
Unit – 2	**Number of lectures = 7**	**Title of the unit: Techniques in developing Fingerprints.**				
Development of chance, latent, visible and plastic prints. Conventional methods of development of latent prints-fluorescent methods, magnetic powder method, fuming method, chemical method etc. Application of laser and other radiations to develop latent fingerprints, metal deposition method and development of latent prints on skin.						
Unit – 3	**Number of lectures = 7**	**Title of the unit: Other Impressions**				
Importance of Gait pattern, footprints and Shoeprints importance, Tyre marks, skid marks, tread marks, Tool marks & its types. Palm prints & Lip prints - Nature, location, collection and examination of lip prints. Ear prints and their significance. Palm prints and their historical importance.						
Unit – 4	**Number of lectures = 7**	**Title of the unit: Methods of Restoration of Impressions**				

Chemical Methods and techniques for collection and Restoration of Engine chassis Numbers, tracing, tyre marks. Casting of Footprints, Shoeprints and Tool marks and their importance in crime scene investigations.		
11. Brief Description of self learning / E-learning component		
1. http://www.analyst.gov.lk/web/index.php?option=com_content&view=article&id=52&Itemid=60&lang=en 2. http://grangerchem.weebly.com/uploads/8/3/7/0/8370959/the_chemistry_of_latent_fingerprints.pdf 3. https://ncforensics.wordpress.com/2013/06/20/techniques-for-collecting-and-analyzing-fingerprints/ 4. http://www3.ntu.edu.sg/home/EXDJiang/Encyclopidia1.pdf		
12. Books Recommended 1. Bridges, B.C; Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting expert Testimony, Opinion Evidence., Univ. Book Agency, Allhabad,2000 2. Mehta, M.K; Identification of Thumb impression & cross examination of Fingerprints, 3. N.M. Tripathi Pub. Bombay, 1980. 4. Chatterjee, S.K; Speculation in Fingerprint Identification, Jantralekha printing Works, Kolkata, 1981. 5. Cowger James F; Friction Ridge Skin- Comparison & Identification of Fingerprints, CRC Press, NY, 1993 6. Cossidy, M.J; Footwear Identification, Royal Canadian, Mounted Police, 1980. 7. Iannavelli, A.V; Ear Identification, Forensic Identification Series, Paramount,1989. 8. Henry, C.L. &Ganesslen, R.E; Advances in Fingerprint Technology, CRC Press, London,1991. 9. Jain, A.K., Flynn, P.& Ross A.A., Handbook of Biometrics, Springer, New York 2008		

01. Name of the Department: Forensic Sciences						
02. Course Name	**General Forensic Sciences**			**L**	**T**	**P**
03. Course Code	**17100103**			2	0	0
04. Type of Course (use tick mark)		**Core ()**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (*)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Know the significance of forensic science to human society. **CO2:** Understand the fundamental principles and functions of forensic science. **CO3:**Understand the working of the forensic establishments in India and abroad.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Functions of Forensic Science**				
Functions of Forensic Science, Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Tools and techniques in forensic science. Branches of forensic science. Data depiction. Report writing. Expert witness. Presentation of evidence and evidentiary clues.						
Unit – 2	**Number of lectures = 7**	**Title of the unit: Forensic Science In India**				
Forensic science in India: Organizational set up of forensic science laboratories. Administration and Organizational Setup: DFSS, CFSL, GEQD, SFSL, RFSL, MFSL, FPB, NICFS, CDTS, NCRB, BPR&D, Qualifications and duties of Forensic Scientists Academic centres of education and research: Indian and Academy of Forensic Science, American Board of Forensic Science, American Board of Forensic Odontology, Bureau of Alcohol Tobacco and Firearms, Interpol and FBI, Australian Academy of Forensic Sciences.						
Unit – 3	**Number of lectures = 7**	**Title of the unit: Expert testimony and Acts**				
Forensic Expert: Definition and related Laws & Issues, Evidence in Enquiries and Trials, Expert Witness (CrPC. 291-93), Indian Evidence Act - Section 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Briefs of Information Technology IT Act, Narcotic Drugs & Psychotropic Substances Act, Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Prevention of Corruption Act, Arms Act, Wild Life Protection						

Act, IT. Act.		
Unit – 4	**Number of lectures = 7**	**Title of the unit: Introduction of offences and Penalties**
Offences against the person-Sections: 299, 300, 302, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362, 375 and 377. Offences against property- Sections:-378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503 and 511.489A, 497, 499, 503 and 511.		
11. Brief Description of self learning / E-learning component		
1. https://epgp.inflibnet.ac.in/ahl.php?csrno=16 2. https://drive.google.com/file/d/122C9NaIYt5xamwKhiUa2X_tJCvR3x6vE/view 3. http://www.forensicpage.com/new10.htm		
12. Books Recommended 1. Houck, M.M. & Siegel, JA; Fundamentals of Forensic Science, Academic 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, N. Delhi, 2001. 4. James, SH 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. Sharma, B.R. (1974) Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.		

01. Name of the Department: Forensic Sciences						
02. Course Name	**Research methodology & Professional Ethics**			**L**	**T**	**P**
03. Course Code	**17100104**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Know about Basics of research. **CO2:** Know the different components of research. **CO3:** Understand the concepts of research hypothesis. **CO4**: Understand the statistics tool used for interpretation of data.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit:Research and Research Design**				
Research Proposal & Research Design: Need, objectives, important concepts etc. Research Report writing: Introduction, Review of Literature: Research Reading, Critical Readingand Consulting Source Material. Components of a Research report: Title, Authors and addresses, Abstract, Summary, Synopsis, key words.						
Unit – 2	**Number of lectures = 7**	**Title of the unit:Concepts of Hypothesis**				
Hypothesis: Test of hypothesis, Null hypothesis, alternative hypothesis, Materials and Methods, Sampling methodologies, Results, Discussion, Conclusions, Acknowledgements, and Appendixes. References: Different Systems of Citing References, Bibliography, Copyright and Plagiarism issues, Footnotes.						
Unit – 3	**Number of lectures = 7**	**Title of the unit:Measures of Central Tendencies**				
Introduction to Scientific Evidence and Statistics, Measures of central tendency and Discrete random variables, Estimation of mean, mode, median and standard deviation. Hypothesis testing for one or two population means.						
Unit – 4	**Number of lectures = 7**	**Title of the unit: Hypothesis Testing**				

Student t-test, Hypothesis testing for small sample sizes and multinomial experiments, Fisher's exact test,. Briefs of Z-test, T-test, Paired Test, Chi-square test, F-Test.		
11. Brief Description of self learning / E-learning component		
1. http://shodhganga.inflibnet.ac.in/bitstream/10603/70587/9/09_chapter%201.pdf 2. http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-Research_Methodology_A_Step-by-Step_G.pdf 3. http://www.modares.ac.ir/uploads/Agr.Oth.Lib.17.pdf		
12. Books Recommended		
1. C.G.G. Aitken and D.A Stoney (1991) The use of statistics in Forensic Science, Ellis Horwood Limited, England. 2. Sokal, R.R & Rolf, F.J: Biometery, Principles & Practices of Statistics in Biological Research 3. Yogesh KS (2006) Fundamental of Research Methodology and Statistics.		

01. Name of the Department: Forensic Sciences						
02. Course Name	**Practical –I**			**L**	**T**	**P**
03. Course Code	**17100104**			0	0	4
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =		**Tutorials = 02**		**Practical = 08**		
08. Course Outcomes (COs):						
CO-1: Students would be able to take and classify fingerprints. **CO-2:** They would also be able to compare fingerprints. **CO-3:** They would utilize different developing methods of latent/chance prints. **CO-4:** They would be able to understand poroscopy.						
Practicals						
1. To obtain Plain and rolled inked finger prints. 2. To identify the finger Print Patterns. 3. To perform Ridge tracing and Ridge counting. 4. To identify the Ridge characteristics (Minutia). 5. To compare the finger Prints. 6. To develop latent finger Prints with powdering methods. 7. To develop latent finger Prints with fuming methods. 8. To develop latent finger Prints with chemical methods.						

SEMESTER-II

<table>
<tr><td colspan="7">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Crime Scene Management</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100201</td><td>2</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = 28</td><td colspan="2">Tutorials = Nil</td><td colspan="3">Practical = Nil</td></tr>
<tr><td colspan="7">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">The students will able to –

CO1:Understand the Protocol and ethics of Crime scene Investigation.
CO2:Know report writing and present in Indian justice system.
CO3:Understand the legal importance of chain of custody.
CO4:Able to handle tools and for analysis of different types of crime scene evidence.</td></tr>
<tr><td colspan="7">10. Unit wise detailed content</td></tr>
<tr><td>Unit-1</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit: Crime Scene & its types</td></tr>
<tr><td colspan="7">Defining a crime scene, Importance, problem, location and processing of Crime Scene and Crime scene Management. Types: Mobile, Indoor and outdoor crime scenes; various searching techniques used for locating physical evidences at scene of crime.</td></tr>
<tr><td>Unit – 2</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit: Tools and techniques in Crime Scene Management</td></tr>
<tr><td colspan="7">Documentation, sketching, field notes and photography. Searching, handling and collection, preservation and transportation of physical evidences. Reconstruction of scene of crime. Report writing.</td></tr>
<tr><td>Unit – 3</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit: Physical Evidences</td></tr>
</table>

Definition, types of physical evidences, Collection, packaging, preservation and forwarding of physical evidences, Chain of custody.		
Unit – 4	**Number of lectures = 7**	**Title of the unit: Expert Testimony**
Expert testimony and eye-witness report. Processing of evidences in court, admissibility of evidences in court Police duties, responsibilities and powers maintenance of crime scene. Scientific approach on Evidences and validation.		
11. Brief Description of self learning / E-learning component		
1. https://www.youtube.com/watch?v=sv96E5Hbgf8 2. https://epgp.inflibnet.ac.in/ahl.php?csrno=16 3. https://drive.google.com/file/d/122C9NaIYt5xamwKhiUa2X_tJCvR3x6vE/view 4. https://drive.google.com/file/d/1MY557S0fZc1Mv2GXxAY4CFi0m5Wr03gG/view 5. http://www.forensicpage.com/new10.htm		
12. Books Recommended		
1. Houck, M.M & Siegel, J.A; Fundamentals of Forensic Science, Academic 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. 8. Robertson and Vignaux; Interpreting Evidence, John Wiley, New York, 1995		

01. Name of the Department: Forensic Sciences						
02. Course Name	**InstrumentalTechniques**			**L**	**T**	**P**
03. Course Code	**17100202**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO 1:** Understand different chromatographic techniques like TLC and GC-MS **CO 2:**Know about UV-vis and FTIR spectrophotometry **CO 3:** They would be familiar to Physical methods of analysis like AAS, XRD etc. **CO 4:** They would be able to explain merits and demerits of all such methods.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Spectroscopic techniques I**				
Fluorescence, phosphorescence and their forensic applications, radiation filters. Detection of radiations; photographic detectors, photoelectric detectorsetc. ElementsofX-rayspectrometry,fluorescence,energy dispersive X-ray analysis (EDX), wavelength dispersive X-ray analysis (WDX), X-ray diffraction.						
Unit – 2	**Number of lectures = 7**	**Title of the unit: Spectroscopic techniques- II**				
Types of sources, structural factors, instrumentation, comparison of luminescence and UV-visible absorption methods. FTIR, Atomic absorption spectrometry: Instrumentation and techniques, interference in AAS,quantitative analysis,applications.						

Unit – 3	Number of lectures = 7	Title of the unit: Chromatography and Electrophoretic Techniques.
Basic principles, theory and instrumentation on Chromatographic Techniques such as TLC HPLC, GC, GCMS, Electrophoretic Technique: General principles, theory, Factors affecting electrophoresis, Lowvoltage thin sheet electrophoresis.		
Unit – 4	**Number of lectures = 7**	**Title of the unit: Biochemical techniques**
Biological and biochemical techniques: General principles of Biological/ Bio-chemical Analysis, pH and buffers,Centrifugation Techniques, Immuno-chemical Technique, General principles, Production of antibodies, Precipitin reaction, Gel immune-diffusion, Immuno- electrophoresis, complement fixation.		
11. Brief Description of self learning / E-learning component		
1. https://www.sciencedirect.com/topics/neuroscience/atomic-absorption-spectroscopy 2. http://www.microspectra.com/component/content/article/52-craictech/292-raman-spectroscopy 3. https://www.livescience.com/64241-x-ray-spectroscopy.html		
12. Books Recommended		
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 South Wales, 1978. 7. Dudley, H. Williams & Fleming, I; Spectroscopic Methods in Organic Chemistry, 4th Edn, Tata McGraw- Hill Publishing Company, New Delhi, 1994.		

01. Name of the Department: Forensic Sciences						
02. Course Name	**Basic Questioned Documents**			**L**	**T**	**P**
03. Course Code	**17100203**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Develop an understanding on Individuals Characteristics feature of handwriting. **CO2:**Understand different instrumental techniques that use in document examinations. **CO3**: Know about different forgeries and their Examination.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Documents and handwriting**				
Questioned Document: Definition, Importance, Classification, nature, Scope, development, of Questioned documents. Preliminary Examination of questioned document. Handwriting: General and individual characteristics of handwriting. Development of individuality in handwriting. Examination and comparison of handwritings. Natural variations and fundamental divergences in handwritings.						
Unit – 2	**Number of lectures = 7**	**Title of the unit: Forgeries**				
Forgery and its types and characteristics, identification and examination of forgeries. Decipherment of secret indented and charred documents: Preservation of documents, Examination of seal and other mechanical impressions,						

examination of sequence of intersecting of strokes. Standards for Comparison and Disguise etc.

Unit – 3	Number of lectures = 7	Title of the unit: Age of Document & Alterations

Determination of Age of Document- Absolute/relative Age, Indented and Invisible Writings, Alterations in the document: erasures, additions, overwriting and obliterations. Comparison of type written/printed matter: Printing and Machine Defects, alterations in typed text, various type of typewriting devices- check writing machines, electronic typewriter and proportional spacing typewriter. Comparison of Printed matter: Various Printing Processes.

Unit – 4	Number of lectures = 7	Title of the unit: Typewritten & Currency Note Examination

Identificationofelectronictypewriters, Working of typewriter such asdotmatrix,inkjetandlaserjetprinters,examinationof blackandwhiteandcolorphotocopies,faxmessagesandcarboncopies. Currency Note examination, Identifying features of fake and genuine Indian currency notes.

11. Brief Description of self learning / E-learning component

1. https://nij.gov/topics/forensics/evidence/questioned-documents/pages/welcome.aspx
2. https://www.thefreedictionary.com/forgeries
3. http://www.analyst.gov.lk/web/index.php?option=com_content&view=article&id=52&Itemid=60&lang=en
4. http://grangerchem.weebly.com/uploads/8/3/7/0/8370959/the_chemistry_of_latent_fingerprints.pdf
5. https://ncforensics.wordpress.com/2013/06/20/techniques-for-collecting-and-analyzing-fingerprints/
6. http://www3.ntu.edu.sg/home/EXDJiang/Encyclopidia1.pdf

12. Books Recommended

1. Hilton,O;ScientificExaminationofQuestionedDocuments.RevisedEdition,Elsevier, New York,1982.
2. Osborn,A.S;QuestionedDocuments,2ndEd.,universalLawPublications,Delhi,1998.
3. Osborn,A.S;TheProblemofProof,2ndEd.,UniversalLawPub.Delhi,1998.
4. Thomas, C.C; Identification System for Questioned Documents, Billy Prior Bates Springfield, Illinois, USA,1971.
5. Harrison, W.R; Suspect Documents Their Scientific Examination, Universal Law Publication, Delhi,2001.
6. Morris,R.N;ForensicHandwritingIdentification,AcademyPress,London,2001.
7. Sheila, K; Graphotypes a new Plant on Handwriting Analysis, Crown Pub. Inc.,USA, 1983.
8. Lerinson, J; Questioned Documents, Academy Press, London,2001.
9. Iannavelli,A.V;EarIdentification,ForensicIdentificationSeries,Paramount,1989.
10. Jain,A.K.,Flynn,P.&RossA.A.,HandbookofBiometrics,Springer,NewYork2008

01. Name of the Department: Forensic Sciences						
02. Course Name	**Forensic Psychology**			**L**	**T**	**P**
03. Course Code	**17100204**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Students would be able to explore their expertise in forensic psychology. **CO2:** They can make use of psychological assessment in criminal behavior. **CO3:** They would be able to describe functioning of Polygraph, BEOS and Narco test. **CO4:** They could make people aware of the legal aspects and ethics of forensic psychology.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Sign of Death**				
Basics: Forensic Psychology and the Law, Ethical Issues in Forensic Psychology, Civil and criminal case assessment, Assessing mental competency, Mental disorders and Forensic Psychology, Eye witness testimony, Criminal profiling- need and types, Forensic Scientific evidence, Crime and Psychopathology, Genetics and Crime, Serial murders, Modus Operandi.						
Unit – 2	**Number of lectures = 7**	**Title of the unit:Medico legal aspects of death**				
Psychological Assessment: Psychological Assessment Tools, Detection of deception, Various methods for detection of deception, Interview, Non-verbal detection, statement assessment, Hypnosis, Psychological						

assessment, voice stress analyzer, Polygraph, thermal imaging, Brain Electrical Oscillation Signature Profiling, Functional Magnetic Resonance study, Current research in detection of deception/truth finding mechanisms.		
Unit – 3	**Number of lectures = 7**	**Title of the unit:Personal Identification**
Polygraph: Historical aspects of Polygraph, Principles of polygraph, psycho physiological aspects, operational aspects, Question formulation techniques, Interviewing technique procedure, The Art-Polygraph, Legal and Ethical aspects, Human rights of individual		
Unit – 4	**Number of lectures = 7**	**Title of the unit: Forensic Anthropology**
Narco-Analysis: Historical aspects, Principle and Theory, General Procedure -Legal and Ethical aspects, Human rights of individual. Brain Electrical Oscillation Signature (BEOS) Profiling: Principle and Theory, General Procedure - Legal and Ethical aspects, Human rights of individual.		

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=PJS-dXzBthQ
2. https://www.youtube.com/watch?v=dOBSYw4KjYg
3. https://www.youtube.com/watch?v=69Tm_i8tQvI
4. https://www.youtube.com/watch?v=6UJAQTd21mc
5. https://www.youtube.com/watch?v=kYj0e_4ATAc
6. https://www.youtube.com/watch?v=0yqLGILVUKA
7. https://www.youtube.com/watch?v=m3freAae6lw&list=PL_a1TI5CC9RGtlqwm2AbTi7IWpeENpJ__
8. https://www.youtube.com/watch?v=33tPtKKAsFY

12. Books Recommended

1. Forensic Science in Criminal Investigation & Trials - B.R.Sharma
2. The Hand Book of Forensic Psychology – Weiner Hass
3. Hand Book of Forensic Psychology – O' Donohue Levensky
4. Brain Experience – C.R.Mukundan
5. Criminal Profilling – B.Turvey
6. Investigative Forensic Hypnosis – J. Niehans
7. Art & Science of the Polygraph Techniques – J.A.Matte
8. Hand Book of Polygraph Testing – M.Kloinen
9. Detecting Lies & Deceit – A.Vrij

01. Name of the Department: Forensic Sciences						
02. Course Name	**Practical –II**			**L**	**T**	**P**
03. Course Code	**17100205**			0	0	4
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 09**		
08. Course Outcomes (COs):						
The students will able to – **CO 1:**Identify and compare handwriting and signatures under question. **CO 2:**Detect written forgeries & disguise **CO 3:**Compare Typewritten scripts **CO 4:** Identify and describe different types of bones and their measurements.						
10. Unit wise detailed content						
Practicals						
1. To determine age and race from skull and teeth. 2. To determine sex from skull. 3. To determine sex from pelvis. 4. To study identification and description of bones and their measurements. 5. Identification of Handwriting Individual Characteristics. 6. Detection of Simulated& Traced forgery.						

7. Study of Disguise in handwriting. 8. Comparison of Typewritten scripts 9. Currency note examination

SEMESTER-III

Specialization (Physical Sciences)

01. Name of the Department: Forensic Sciences						
02. Course Name	**Basic Forensic Ballistics**			**L**	**T**	**P**
03. Course Code	**17100301**			0	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1**: Know the handling and functioning of firearms and firing mechanism. **CO2:** Understand the different categories of ballistics and its importance in investigations. **CO3**: Know the important components and system of firing.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit:Forensic Ballistics**				
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.

Unit – 2	**Number of lectures = 7**	**Title of the unit**: **Internal 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,corrosionandgascutting,measurements of trajectory parameters, Escape velocity & Ricochet. Firearms, ammunition and their components identification and examination, different types of marks produced during firing process on cartridge-firing pin marks, breechface marks, chamber marks, extractor and ejector marks and on bullet number/direction of landsandgrooves,striationmarksonlandsandgrooves,identificationofvariouspartsoffirearms, techniques for obtaining test material from various types of weapons and their linkage with fired ammunition, class and individual characteristics.

Unit – 3	**Number of lectures = 7**	**Title of the unit: Ammunitions**

Forensic 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 trendsintheirmanufacturinganddesign,smoothborefirearmprojectile,identificationof origin, improvised ammunition and safety. Identification of origin, improvised/country- made/ imitative firearms and their constructionalfeatures.

Unit – 4	**Number of lectures = 7**	**Title of the unit: Range Of Fire**

Determination of Range of Fire- burning, scorching, blackening, tattooing and metal fouling shots dispersion and GSR distribution, time offering different method employed, and their limitations, Bullet recovery, time of firing. Gunshot Residues/ Powder Residues: Composition of GSR depending upon propellants & primer mixtures, GSR Distribution, Mechanism of formation of GSR, Location, source and collection of GSR, Analysis of GSR: spot test, chemical test, identification of shooter and instrumental techniques involved of GSR Analysis, Practical problems related with GSR detections.

11. Brief Description of self learning / E-learning component

1. https://swayam.gov.in/course/201-forensic-ballistics
2. https://www.academia.edu/13063452/3._3._9._Forensic_Ballistics
3. https://www.slideshare.net/chaitrapradeep2/introduction-to-forensic-ballistics
4. https://study.com/academy/lesson/ballistics-definition-lesson.html

12. Books Recommended

1. Hatcher Jury & Weller (1987) Firearm Investigation Identification and Evidence, The University Book Agency, Allahabad.
2. Jauhri, M. (1980) Monograpnh on Forensic Ballistics, Govt. of India Publication, New Delhi.
3. Sharma, B.R. (1990) Firearms in Criminal Investigation and Trails.
4. Dimado (1987) Gunshot Wounds.
5. Kumar (1987) Forensic Ballistics in Criminal Justice.
6. Brian J. (2008) Handbook of Firearm and Ballistics Examination and Interpretation Forensic Evidence.

7. James Smyth Wallace (2008) Chemical Analysis of Firearms, Ammunition, and Gunshot Residues.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Basic Forensic Physics & Forensic Voice Examination**			**L**	**T**	**P**
03. Course Code	**17100302**			0	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:**Understand Importance of Soil, glass, Paint and cement as physical Evidences. **CO2:** Know the forensic significance of tool marks. **CO3:**Understand about the Voice /Tapes authentication & Speaker recognition.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Soil, Cement and Concrete**				
Types and composition of soil, sample preparation, removal of contaminants, colour, molecular particle size distribution, turbidity test, pH measurements, microscopic examination, density gradient analysis, ignition-loss test, elemental analysis, interpretation of soil evidence.						

Unit – 2	Number of lectures = 7	Title of the unit: **Paint & Glass**
Typesofpaintandtheircomposition,macroscopicandmicroscopicanalysisofpaintpigments, pigment distribution, micro-chemical analysis- solubility test, pyrolysis gas chromatography, TLC, colorimetric analysis, IR spectroscopy and X-ray diffraction, elemental analysis, mass spectrometer, interpretation of paintevidence. Types of glass and their composition-soda-lime, borosilicate, safety glass, laminated, light-sensitive,tampered/toughened,wireglass,colouredglass.Matchingandcomparison		
Unit – 3	**Number of lectures = 7**	**Title of the unit -Voice/Tape Authentication**
Introduction to human Voice, Nature of voice and production of speech, perception of voice and speech, speech signal processing & pattern recognition basic factor of sound in speech acoustic characteristics of speech signal. Voice as Evidence: Collection of evidence, Quality of evidence, type of evidence, speaker variability and simulation, Transmission and channel distortion, admissibility. Fourier analysis, frequency & time domain representation of speech signal, analogue to digital signal and conversion, analysis of audio & video signal for authenticity.		
Unit – 4	**Number of lectures = 7**	**Title of the unit:Speaker Recognition**
Introduction to the technique of pattern recognition and comparison. Speaker recognition and types of speaker recognition, procedures and methods, feature extraction, Speaker recognition by Listening (SRL), speaker recognition by visual comparison of spectrograms (SRS), Automatic speaker recognition (ASR), Recent Development of Computerized Speech Laboratory, Legal Aspects. Speaker profiling, Intelligibility Enhancement of audio recording, Transcription and analysis of disputed utterances, Authenticity and integrity examination of audio recordings.		

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=scP7L6rgovk
2. https://www.youtube.com/watch?v=g8wgAi16O-A
3. https://www.youtube.com/watch?v=wPny8RQg7ts
4. https://www.forensicmag.com/article/2012/05/report-writing-guidelines.
5. https://study.com/academy/lesson/what-is-the-chain-of-custody-definition-procedures-importance.html
6. muniwar.com/nsic/wp-content/uploads/2017/01/Speaker-Identification.pdf
7. tapeexpert.com/pdf/authenticationrecordings.pdf
8.

12. Books Recommended

1. Sharma, B.R: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
2. Forensic Speaker Identification (2007) by Philip Rose
3. DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; An Introduction to Criminalitics, McGraw Hill, New York, 1983.
4. Fisher, B., Techniques of Crime Scene Investigation (6th Edn.) CRC Press, Boca Raton, Florida, 2000.
5. James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 200.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Questioned Documents &Digital Forensics**			**L**	**T**	**P**
03. Course Code	**17100303**			0	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Understand the Authenticity of Documents and its Scientific Approach **CO2**: Know the various types of documents and its examination. **CO3:** Analyze the age of documents written and handwriting characteristics. **CO4:** Identify challenging aspects of digital evidence, IT Act & Cyber terrorism.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Questioned Documents**				
Questioned Document: Definition, Importance, Classification, nature, Scope, development, of Questioned						

documents. Preliminary Examination of questioned documents.Handwriting: General and individual characteristics of handwriting. Development of individuality in handwriting.Examination and comparison of handwritings. Natural variations and fundamental divergences in handwritings.

Unit – 2	**Number of lectures = 7**	**Title of the unit**:**Forgery & Age of Document**

Identification and examination of forgeries. Decipherment of secret indented and charred documents: Preservation of documents, Examination of seal and other mechanical impressions, examination of sequence of intersecting of strokes. Standards for Comparison and Disguise etc. Age of Document & Alterations: Determination of Age of Document- Absolute/relative Age, Indented and Invisible Writings, Alterations in the document: erasures, additions, overwriting and obliterations

Unit – 3	**Number of lectures = 7**	**Title of the unit: Digital Evidences**

Digital Evidence: increasing awareness of digital evidence, challenging aspects of digital evidence, challenging aspects of cyber trail, forensic science and digital evidence, computer image verification and authentication, digital image watermarking and its application in forensic science, Various techniques for digital watermarking, Logical structures of the Microsoft operating system FAT file system, DOS and Windows boot process, How to recover deleted files, The significance and determination of the creation date and time. Web browser security, web proxy, IPv6, Access control techniques.Digital signature and cryptography.

Unit – 4	**Number of lectures = 7**	**Title of the unit: IT Act & Cyber terrorism**

Introduction to Cybercrimes, Distinction between cybercrime and conventional crimes, Reasons for commission of cybercrime, Kinds of cybercrimes – cyber stalking; cyber pornography; forgery and fraud; crime related to IPRs; Cyber terrorism; Spamming, Phishing, Privacy and National Security in Cyberspace, Cyber Defamation and hate speech, computer vandalism etc. Relevant provisions under Information Technology Act, 2000, Indian Penal Code, 1860. Jurisdictional challenges in cyberspace, Investigation challenges in cyberspace, Emerging trends in Information Technology Act, 2000, Need to regulate internet, country specific cyber laws, Legal recognition of electronic records and digital signature, measures to adapt electronic governance, inadequacy in IT act. Report Writing & Court Room Testimony.

11. Brief Description of self learning / E-learning component

1. https://www.us-cert.gov/sites/default/files/publications/forensics.pdf
2. https://www.youtube.com/watch?v=ilTMQU3_1GQ&list=PL_a1TI5CC9RHfuhf1kfVjGYhUAQ9Ht5Pa
3. https://www.youtube.com/watch?v=AxubbuQJ9LU
4. https://www.youtube.com/watch?v=9RYDhw5yjrM
5. https://www.youtube.com/watch?v=RQdou4CCBUI
6. https://www.youtube.com/watch?v=eOfa0RrBxbI
7. https://www.youtube.com/watch?v=S_yrfqMtUBQ
8. https://www.youtube.com/watch?v=taladDGFgKM
9. https://www.youtube.com/watch?v=23oYYMrvAsk
10. https://www.nist.gov/document/cftt-pres-intro-digital-forensics-aug-2015
11.
12. https://www.dhs.gov/sites/default/files/.../Digital-Forensics-Tools-TN_0716-508.pdf

12. Books Recommended

1. Hilton,O;ScientificExaminationofQuestionedDocuments.RevisedEdition,Elsevier, New York,1982.
2. Osborn,A.S;QuestionedDocuments,2ndEd.,universalLawPublications,Delhi,1998.

3. Osborn,A.S;TheProblemofProof,2ndEd.,UniversalLawPub.Delhi,1998.
4. Thomas, C.C; Identification System for Questioned Documents, Billy Prior Bates Springfield, Illinois, USA,1971.
5. Nathan Clarke (2010) Computer Forensics.
6. Eoghan Casey BS MA (2001) Handbook of Computer Crime Investigation: Forensic Tools and Technology
7. Marjie T. Britz (2003) Computer Forensics and Cyber Crime: An Introduction
8. Linda Volonino and Reynaldo Anzaldua (2008) Computer Forensics For Dummies
9. Warren G. Kruse II and Jay G. Heiser (2001) Computer Forensics: Incident Response Essentials
10. Robert C. Newman (2007) Computer Forensics: Evidence, Collection and Management .
11. Eoghan Casey BS MA (2001) Handbook of Computer Crime Investigation: Forensic Tools and Technology
12. The Indian IT Act 2000.
13. Steve Bunting (2007) The Official EnCE - EnCase Certified Examiner Study Guide.
14. Robert C. Newman (2007) Computer Forensics: Evidence, Collection and Management
15. Eoghan Casey (2009) Handbook of Digital Forensics and Investigation
16. Tewari, R.K., Sastry, P.K. and Ravikumar, K.V. (2003) Computer Crime & Computer Forensics select Publisher, New Delhi.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Practical (Physical Sciences)**			**L**	**T**	**P**
03. Course Code	**17100304**			0	0	9
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 9**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** To Examine the various Physical Evidences found at Crime Scene. **CO2:** Significance of Physical evidence in Reconstruction of Crime Scene. **CO3:** Simulated Crime Scene Exercise on Evidences collection examination under Chain of Custody.						
Practicals						
Simulated Crime Scene Exercise on:						

1. General guidelines for lifting of crime scene exhibits.
2. Photography and sketching of crime scene.
3. Lifting of footprints from different surfaces.
4. Determination of direction of impact on glass.
5. Comparison of soil samples by microscopic and density gradient measurements.
6. To identify whether firearms are country made or factory made.
7. Lifting of gun-shot residues.
8. To open and draw the diagram of given cartridge & mark it's components for identification.
9. Identification of various components of firearm.

11. Brief Description of self learning / E-learning component

12. Books Recommended

1. DFS Manuals of Forensic Science

01. Name of the Department: Forensic Sciences						
02. Course Name	**Assignments & Seminars**			**L**	**T**	**P**
03. Course Code	**17100305**			0	2	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =		**Tutorials = 02**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:**Enhance the Communication skills and thorough knowledge on particular topics. **CO2**: Work and preparation on Assignments based on case studies.						

Specialization (Chemical Sciences)

<table>
<tr><td colspan="7">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Basic Forensic Chemistry</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100306</td><td>2</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = 28</td><td colspan="2">Tutorials = Nil</td><td colspan="3">Practical = Nil</td></tr>
<tr><td colspan="7">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">The students will able to –

CO1: Understand the basics of Forensic Chemistry &Explosives.
CO2: Assess the Fire & Arson cases in crime scene investigations.
CO3:Examination and identification of Adulteration of petroleum products.</td></tr>
<tr><td colspan="7">10. Unit wise detailed content</td></tr>
</table>

Unit-1	Number of lectures = 7	Title of the unit: Chemical evidences and their analysis
Introduction Forensic chemistry, sampling of chemical evidences, presumptive, screening (colour/ spot test), inorganic analysis. Detective dyes- cases and importance in trap cases.		
Unit – 2	**Number of lectures = 7**	**Title of the unit**: **Explosives**
Explosives. Classification of explosives. Explosion process. Blast waves. Searching the scene of explosion. Post blast residue collection and analysis. Blast injuries. Detection of hidden explosives, synthesis and characteristics of Tri-nitro toluene (TNT), Pentaerythritol tetranitrate (PETN) and Research and Development Explosives (RDX).		
Unit – 3	**Number of lectures = 7**	**Title of the unit: Chemistry of Fire**
Arson Chemistry of fire, Fire tetrahedron, Fire triangle, searching of fire scene, collection, preservation and examination of arson evidences. Arson; Searching the fire scene. Scientific investigation and evaluation of clue materials.		
Unit – 4	**Number of lectures = 7**	**Title of the unit:Detection of Petroleum Products**
Detection of hidden explosives. Adulteration of petroleum products. Detective dyes; Analysis of phenolphthalein in trap cases		

11. Brief Description of self learning / E-learning component

1. https://www.slideshare.net/joulyn/forensic-toxicology-an-introduction
2. https://www.robsonforensic.com/practice-areas/alcohol-drug-abuse-expert
3. https://www.cranfield.ac.uk/Courses/Short/Defence-and-Security/Forensic-Investigation-of-Explosives-and-Explosive-Devicesb h bhy6

12. Books Recommended

1. MorrisonR.TandBoydR.N;OrganicChemistry6thEdPrenticeHall,2003
2. Laboratory Procedure Manual : Petroleum Products ,Directorate of Forensic Science, MHA, Govt. of India,2005
3. WorkingProcedureManualonChemistry;DirectorateofForensicScienceMHAGovt. ofIndia
4. BureauofIndianStandardSpecificationsrelatedtoAlcoholsandPetroleumProducts.
5. Watson C. A; Official and Standardised Methods of Analysis, Royal Society of Chemistry,UK,1994.
6. Feigl,F;SpotTestinInorganicAnalysis,ElsevierPubl.NewDelhi,2005.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Basic Forensic Toxicology**			**L**	**T**	**P**
03. Course Code	**17100307**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Understand toxic profile of various drugs and other xenobiotics including sources, identification, symptoms, management, control and first aid measures. **CO2**: Assess drug interactions and adverse drug reactions - analyze, evaluate and interpret clinical cases of toxicity.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit:Mechanism of poisons**				
Forensic Toxicology Significance of toxicological findings. Techniques used in toxicology. Poisons.Classification of poisons.Physico-chemical and mode of action of poisons.Accidental, suicidal and homicidal poisonings.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**: **Analysis of Viscera**				
Collection and preservation of viscera, blood and urine for various poison cases.Metabolism and excretion of poisons						
Unit – 3	**Number of lectures = 7**	**Title of the unit: Forensic Pharmacology**				
Definition, classification of poisons- organic, inorganic, metallic, non-metallic etc. Acute and chronicpoisoning,Accidental,homicidalandsuicidalpoisoning,Extractionandidentification of commonly used poisons. Dosage, Frequency, Route of administration.						
Unit – 4	**Number of lectures = 7**	**Title of the unit:Drugs of Abuse**				
Natural and synthetic drugs of abuse. Drug dependence, classification of drugs- Narcotics, Hallucinogens,Depressants,Stimulants,Anabolicsteroids.						
11. Brief Description of self learning / E-learning component						

1. https://www.slideshare.net/joulyn/forensic-toxicology-an-introduction
2. https://www.robsonforensic.com/practice-areas/alcohol-drug-abuse-expert
3. https://www.cranfield.ac.uk/Courses/Short/Defence-and-Security/Forensic-Investigation-of-Explosives-and-Explosive-Devicesb h bhy6

12. Books Recommended

1. Niesink, RJM; Toxicology- Principles and Applications, CRCPress,1996.
2. Modi,JP,TextbookofMedicalJurisprudence&Toxicology,N.M.TripathiPub,2001.
3. Chadha, PV; Handbook of Forensic Medicine & Toxicology, Jaypee Brothers, New Delhi,2004.
4. Parikh, C.K; Text Book of Medical Jurisprudence, Forensic Medicine & Toxicology, CBS Pub. NewDelhi,1999.
5. CurryA.S;AnalyticalMethodsinHumanToxicology:PartII,CRCPressOhio,1986.
6. Curry, A.S : Poison Detection in Human Organs, C Thomas Spring field, CRC Press, Costa Rica,1976.
7. ClarkE.G.C;IsolationandIdentificationofdrugs,AcademicPress,London,1986.
8. SunshineI:HandbookofAnalyticalToxicpology,CRCPress,CostaRica,1969.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Analytical Techniques in Toxicology**			**L**	**T**	**P**
03. Course Code	**17100308**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Understandthe analytical techniques used in for elimination of Toxics and its Examination. **CO2**: To know the basic instruments used in Forensic Toxicology for examinations of Various drug and poison.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Presumptive/Screening Test**				
Presumptive/ Screening and Confirmatory Methods: Color/spot test, Microscopic examination, Microcrystalline tests, Thin-Layer Chromatography, Sample Preparation before TLC Specimen, Extraction Evaluation of TLC for Drug Screening.						
Unit – 2	**Number of lectures = 7**	**Title of the unit:UV Spectroscopy**				
Fundamental laws of spectrophotometry, Deviation from Beer's Law, Instrumentation and techniques, qualitative and quantitative methods in UV-Visible spectroscopy, Forensic applications, Basics of Fluorescence, Phosphorescence and Chemiluminescence spectrometry.						
Unit – 3	**Number of lectures = 7**	**Title of the unit:.X-ray spectroscopy**				
X-ray absorption and fluorescence methods, X-ray diffraction, Auger emission spectroscopy (AES), and electron spectroscopy for chemical analysis (ESCA).						
Unit – 4	**Number of lectures = 7**	**Title of the unit:Neutron Activation Analysis**				
Radioactive Isotope, Principles, Theory, Instrumentation- Various Neutron Sources, Detection and Measurement of Gamma-Rays for Qualitative And Quantitative Analysis.						
11. Brief Description of self learning / E-learning component						
1. https://www.youtube.com/watch?v=qdmKGskCyh8 2. https://www.youtube.com/watch?v=DKEQdU24eJA						

3. https://www.youtube.com/watch?v=T6rPzQVTCZQ
4. https://www.youtube.com/watch?v=HwD1UEUOixI

12. Books Recommended

1. Borrow (1980) Molecular Spectroscopy.
2. Willdard, H. H (1974) Instrumental Methods of Analysis.
3. Moonesens A.A. (1979) Scientific Evidence in Criminal Cases.
4. Lundquist & Curry (1963) Methods of Forensic Science.
5. Settle,F.A.(1997) Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall.
6. E. Stahl (1969) Thin Layer Chromatography: A Laboratory Handbook.
7. Sue Jickells and Adam Negrusz (2008) Clarke's Analytical Forensic Toxicology.
8. Forensic Chemistry: Max M Houck (2015).

01. Name of the Department: Forensic Sciences						
02. Course Name	**Practical (Chemical Sciences)**			**L**	**T**	**P**
03. Course Code	**17100309**			0	0	11
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 11**		
08. Course Outcomes (COs):						
The students will able to – CO1: Conduct Presumptive Drug Testing by using various methods. CO2: Extract and analyse different categories of poisons from viscera CO3: Detect metallic poisons by using Reinsch Test. CO4: Perform Field test for narcotic drugs.						
Practicals:						

1. Simulated Crime Scene Exercise on:
2. Field test for narcotic drugs.
3. TLC separation of pesticides/insecticides & Identification using chromomeric reagents
4. Lab testing of Aluminum Phosphide (Phosphine gas)
5. Identification of Gaseous Poisoning (Carbon Monoxide and HCN)
6. Detection of metallic poisons using Reinsch Test.
7. Extraction and analysis of different categories of poisons from viscera.
8. Estimation alcohol in Blood.
9. Microscopic Identification of some plant poisons.
10. Analysis of viscera and food material for in case of food poisoning by chemical microscopic and instrumental techniques.
11. 10. Qualitative Descriptions of Toxicity Exposure Limits Determination of LD50 and ED50, Units in Toxicology.

11. Brief Description of self learning / E-learning component

12. Books Recommended

1. DFS Manuals of Forensic Science

01. Name of the Department: Forensic Sciences						
02. Course Name	**Assignments & Seminars**			**L**	**T**	**P**
03. Course Code	**17100310**			0	2	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =		**Tutorials = 02**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Enhance the Communication skills and thorough knowledge on particular topics. **CO2**: Work and preparation on Assignments based on case studies.						

01. Name of the Department: Forensic Sciences						
02. Course Name	**Basic Forensic Biology and Serology**			**L**	**T**	**P**
03. Course Code	**17100311**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Students would be able to understand the importance of biological fluids (blood, semen, saliva and other body fluids) in crime investigations. **CO2:** Students would be able to understand the importance, nature, collection and preservation of Hair evidence. **CO3:** Understand the significance of wildlife and the crucial role they can play in providing justice to wildlife. **CO4:** Explain post-mortem interval, manner of death and cause of death by using entomological evidence.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Biological evidences**				
Biological evidence. Importance, nature, location, collection and evaluation of biological evidence. Hair examination. Structure of hair. Growth and replacement of hair. Collection and preservation of hair evidence. Identification from hair.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**: **Blood stains and their significance**				
Blood and blood groups. Forensic characterization of bloodstains. Bloodstain patterns. Forensic significance of semen, saliva, sweat, milk and urine. Scientific basis of DNA typing. Collection of DNA evidence. Applications of DNA typing in criminal and civil cases.						
Unit – 3	**Number of lectures = 7**	**Title of the unit: Wildlife forensic**				
Wildlife forensic. Significance of wildlife forensic. Protected and endangered species of animals and plants. Illegal trading in wildlife items, such as skin, fur, bone, horn, teeth, flowers and plants. Traditional Chinese Medicine. Identification of physical evidence pertaining to wildlife forensics.						
Unit – 4	**Number of lectures = 7**	**Title of the unit: Entomological Evidences**				
Forensic entomology. Insects of forensic importance. Collection of entomological evidence during death investigations.						

11. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=MZTDjix4_Zw
2. https://www.youtube.com/watch?v=MZTDjix4_Zw
3. https://www.youtube.com/watch?v=CNqGkYsTufo
4. https://www.youtube.com/watch?v=ZaRyoVyGsl4
5. https://www.youtube.com/watch?v=taSCtCKVyRs
6. https://www.youtube.com/watch?v=efPx0avVh5w
7. https://www.youtube.com/watch?v=Xe3aCEznmWA
8. https://www.youtube.com/watch?v=YOjDr0IT48w
9. http://www.bloodspatter.com/bloodstain-tutorial
10. https://epgp.inflibnet.ac.in/ahl.php?csrno=16

12. Books Recommended

1. Robertson, J. (1996): Forensic Examination of Hair. Taylor and Francis, USA.
2. Modi, J.K. (1988): Medical Jurisprudence and Toxicology, N.M. Tripathi Pvt. Ltd.
3. Boorman, K. E: Blood Group Serology, Churchill, and Lincolin, P. J. (1988)
4. Race, R. R. and Sangar, R. (1975): Blood Groups in Man. Blackwell Scientific, Oxford.
5. Saferstein, R. (1982): Science Handbook, Vol. I, II and III, Prentice Hall, New Jersey.
6. Culliford, B. E. (1971), The examination and Typing of Blood Stains, US Deptt. of Justice, Washington.
7. Chowdhuri, S. (1971): Forensic Biology, B P R & D, Govt. of India.
8. Dunsfor d, I. and Bowley, C. (1967): Blood Grouping Techniques, Oliver & Boyd, London.
9. Butler, J; Advanced Topics in Forensic DNA Typing: Methodology, 1st Ed., Academic Press, London,2009.
10. Easteal, S. McLeod,N.& Reed,K; DNA Profiling: Principles, Pitfalls and Potential, Harwood Academic Publishers, New Jersey,1991.
11. Dorothy Gennard. Forensic Entomology: An Introduction. John Wiley & Sons, 16-Mar-2012
12. DFSS Laboratory Manual.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Basic Forensic Medicine & Psychiatry**			**L**	**T**	**P**
03. Course Code	**17100312**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:**Know about general aspects of Forensic Medicine. **CO2:**Understand different types of injuries. **CO3:** Explain different types of asphyxial death. **CO4:** Form opinion on Time Since Death, Injuries, Sexual Offences, Asphyxial deaths, Infanticide, Forensic Pathology.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: General Forensic Medicine**				
Forensic Medicine: Definition of Forensic Medicine and Medical Jurisprudence, Dying declaration, Death: Definition, types; somatic, cellular and brain-death, Sudden natural and unnatural deaths. Identification: Definition, Identification of unknown person, dead bodies and remains of a person by age, sex, stature, dental examination, scars, moles, tattoos, dactylography, DNA typing and personal belonging including photographs. Determination of Time Since Death: Immediate changes, Livor, Rigor and Algor mortis, cadaveric spasm, cold stiffening and heat stiffening. Putrefaction, mummification, Adipocere and maceration Postmortem artifacts.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**:**Injuries**				
Injuries: Wounds, Bruises Abrasions, Lacerations, Incised wounds, Stab wounds, Bone damage, Burns and scalds, ante-mortem and post-mortem injuries, aging of injuries, artificial injuries. Sexual Offences: Medico-legal investigation of Sexual offences, including examination of victim and suspect.						
Unit – 3	**Number of lectures = 7**	**Title of the unit:Asphyxial deaths**				
Asphyxial deaths: Definition, causes, types, post-mortem appearances and medico- legal significance of hanging, strangulation, suffocation and drowning. Infanticide: Definition and related issues.						
Unit – 4	**Number of lectures = 7**	**Title of the unit: Forensic Psychiatry**				
Definition and fundamental concepts of forensic psychology and forensic psychiatry. Psychology and law.Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis.						

Polygraphy – operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test. Narco analysis and brain electrical oscillation signatures – principle and theory, ethical and legal issues.

11. Brief Description of self learning / E-learning component

1. https://swayam.gov.in/course/265-forensic-medicine
2. https://www.youtube.com/watch?v=3GtNH-TflyM
3. https://www.youtube.com/watch?v=yFPW016ocXI
4. https://www.youtube.com/watch?v=kYj0e_4ATAc

12. Books Recommended

1. Craniofacial Identification in forensic Medicine, edited by John. G Clement and David. L. Ranso; Oxiford University, Press; 1998.
2. Modi, J.K. (1988): Medical Jurisprudence & Toxicology, N.M. Tripathi Pvt. Ltd.
3. Krishan Vij; Text book of Forensic Medicine; B.I. Churchill Livingstone Pvt. Ltd. 2001.
4. Craniofacial Identification in forensic Medicine, edited by John. G Clement and David. L. Ranso; Oxiford University, Press; 1998.
5. Glaister (Ed)-Rentoul& Smith (1973) : Forensic Medicine & Toxicology, Churchill Livingston, Edinburgh.
6. Modi, J.K. (1988): Medical Jurisprudence & Toxicology, N.M. Tripathi Pvt. Ltd.
7. Glaister Anatomy (Ed)—Rentoul& Smith (1973): Forensic Medicine & Toxicology, Churchill Livingston, Edinburgh.
8. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
9. J.C. DeLadurantey and D.R. Sullivan, Criminal Investigation Standards, Harper & Row, New York (1980).
10. J. Niehaus, Investigative Forensic Hypnosis, CRC Press, Boca Raton (1999).
11. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

01. Name of the Department: Forensic Sciences						
02. Course Name	**Forensic Botany, Entomology & Microbiology**			**L**	**T**	**P**
03. Course Code	**17100313**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Understand the entomological evidence. **CO2:** Know the importance of Botanical evidences **CO3:** Understand the significance of wildlife and the crucial role they can play in providing justice to wildlife. **CO4:**Know the importance of Microbial Forensics.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Forensic Botany**				
Botanical evidences: Introduction, types, location, collection evaluation and forensic significance of Diatoms, Wood, Pollen grains.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**: **Forensic Entomology**				
Forensic Entomology: Introduction, general entomology and arthropod biology, insects of forensic importance, collection of entomological evidence during death investigations, the role of aquatic insects in forensic investigations, Insect succession on carrion and its relationship to determine time since death, its application to Forensic Entomology.						
Unit – 3	**Number of lectures = 7**	**Title of the unit:Microbial Forensics**				
Microbial Forensics : Types and identification of Bacteria and Viruses in Forensic Science, Microbial profiles as identification tools, use of microorganisms in bioterrorism, Anthrax, transmission of HIV as a criminal act, role of microbes in food poisoning.						
Unit – 4	**Number of lectures = 7**	**Title of the unit:Wild life evidences**				
Wild Life Forensics: Introduction, importance, protected and endangered species of Animals and Plants. Identification of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants, by conventional and modern methods, Identification of Pug marks of various animals						
12. Brief Description of self learning / E-learning component						

1. https://www.youtube.com/watch?v=G03zsVrZBS8
2. https://www.youtube.com/watch?v=taSCtCKVyRs
3. https://www.youtube.com/watch?v=HIVKISCmjTQ
4. https://www.youtube.com/watch?v=gwEwgqGJPSk

13. Books Recommended

1. Jason H. Byrd and James L. Castner (2001) Forensic entomology, CRC Press LLC.
2. Forensic Science Hand book by Richard saferstein Vol (II); Prentice Hall, Publications
3. Robertson (1999) : Forensic examination of Hair. Francis & Taylor, USA.
4. Safersstein, R. (1982) Science Handbook; Vol. III, Prentice Hall, New Jersey.
5. Curry, A. S. (1965) Methods of Forensic Science, Vol. IV, Interscience, New Youk.
6. Chowdhuri, S. (1971) : Forensic Biology, B P R & D Govt. of India.
7. Forensic Diatomology by M.S. Pollanen Encyclopedia of Forensic Science, Wiley (2010)

01. Name of the Department: Forensic Sciences						
02. Course Name	**Practical (Biological Sciences)**			**L**	**T**	**P**
03. Course Code	**17100314**			0	0	10
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 10**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Prepare slides of scale patterns of human hair. **CO2:** Examine Barr bodies from hair root. **CO3:**Determine blood group from stains of blood and various body fluids. **CO4:** Study the life cycle of blowfly.						
Practicals:						
1. To prepare slides of scale patterns of human hair. 2. To examine human hair for cortex and medulla. 3. To examine Barr bodies from hair root. 4. To determine blood group from fresh blood and blood stains. 5. To identify blood stains. 6. To identify semen stains. 7. To identify saliva stains. 8. To determine blood group from stains of blood and various body fluids with Absorption-inhibition, mixed agglutination and absorption-elution technique 9. To study the life cycle of blowfly. 10. To study the different microbes.						
11. Brief Description of self learning / E-learning component						
12. Books Recommended 2. DFS Manuals of Forensic Science						

01. Name of the Department: Forensic Sciences						
02. Course Name	**Assignments & Seminars**			**L**	**T**	**P**
03. Course Code	**17100315**			0	2	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =		**Tutorials = 02**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Enhance the Communication skills and thorough knowledge on particular topics. **CO2**: Work and preparation on Assignments based on case studies.						

Semester IV
Specialization (Physical Sciences)

01. Name of the Department: Forensic Sciences					
02. Course Name	**Advanced Forensic Ballistics**		**L**	**T**	**P**
03. Course Code	**17100401**		2	0	0
04. Type of Course (use tick mark)	**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals					
Lectures = 28	**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):					
The students will able to – **CO1:**Understand the working of different firearms and composition of ammunition and bullet trajectory. **CO2:**Explain Terminal Ballistics (entry and exit bullet holes). **CO3:**Determine direction and Range of fire **CO4:**Understand the use of comparison microscope.					
10. Unit wise detailed content					
Unit-1	**Number of lectures = 7**	**Title of the unit:Firearm and Ammunition**			
Definition, Breech Loader and Muzzle loader (Match lock, Wheel lock, Snaphaunce, Flint lock, Percussion), Smooth bore (Shotgun) and Rifled firearms, (Revolver, Pistol and Rifles), Briefs of Indian Arms Act, Country Made/Improvised Firearms, Illegal firearms: AK-47, SKS and M16/AR15 Assault Rifles 47, SKS and M16/AR15 Assault Rifles, Proof Marks of weapons. Concepts of Ammunition: A Brief History of Ammunition, Types of ammunition- 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 bullet and compositional aspects, latest trends in their manufacturing and design projectile, Headstamp Markings.					
Unit – 2	**Number of lectures = 7**	**Title of the unit:Internal Ballistics and External Ballistics**			
Core concepts of Internal Ballistics: Definition, Ignition of the propellant, Shapes of Propellants, Manner of the propellant burning, Piobert's law, Pressure space curve, Shot Start Pressure, All Burnt Point, Velocity, Le Du's formula, Muzzle velocity, various factors affecting the internal ballistics: lock time, barrel time, erosion, corrosion and gas cutting, equation of motion of projectile, Density of loading, Heat problems, Vibration &					

jump, Measurement of strength of firearm, projectile velocity determination, theory of recoil, methods for measurement of recoil.

Core concepts of External Ballistics: Bullet Drop in the flight, Use of sight to compensate for bullet drop, Influence of Earth on Trajectory, Angle of Fall, Ballistic Coefficient and Air resistance-base drag, Sectional Density, Brief introduction to Terminal velocity, Maximum effective range, Drift, Yaw, Precession, Nutation, Terminal velocity, Ballistics tables, measurements of trajectory parameters, Escape velocity & Ricochet.

Unit – 3	**Number of lectures = 7**	**Title of the unit: Determination of Range of Fire**

Determination of Range of Fire- burning, scorching, blackening, tattooing and metal fouling shots dispersion and GSR distribution, time offering different method employed, and their limitations, Bullet recovery, time of firing.

Gunshot Residues/ Powder Residues: Composition of GSR depending upon propellants & primer mixtures, GSR Distribution, Mechanism of formation of GSR, Location, source and collection of GSR, Analysis of GSR: spot test, chemical test, identification of shooter and instrumental techniques involved of GSR Analysis, Practical problems related with GSR detections.

Unit – 4	**Number of lectures = 7**	**Title of the unit: Forensic Photography**

Principles and practice of identification of origin: ammunition and their components, different types of marks produced during firing process on cartridge- firing pin marks, breech face marks, chamber marks, extractor and ejector marks band on bullet- number/ direction of lands and grooves, striation marks on lands and grooves, identification of various parts of firearms, class and individual characteristics.

Instrumental techniques used for ballistic evidence analysis: Boroscope, Comparison Microscope, Stereo microscope, traveling microscope, Neutron Activation analysis, Flameless, AAS, Scanning Electron microscope, EDXRF. Management of ballistics data (NIBIN and IBIS), History of establishment, Brass Trax, Bullet Trax& Match Point, Limitation & Advantages, Applications.

11. Brief Description of self learning / E-learning component

1. https://swayam.gov.in/course/201-forensic-ballistics
5. https://www.academia.edu/13063452/3._3._9._Forensic_Ballistics
6. https://www.slideshare.net/chaitrapradeep2/introduction-to-forensic-ballistics
7. https://study.com/academy/lesson/ballistics-definition-lesson.html

12. Books Recommended

1. Hatcher Jury & Weller (1987) Firearm Investigation Identification and Evidence, The University Book Agency, Allahabad.
2. Jauhri, M. (1980) Monograpnh on Forensic Ballistics, Govt. of India Publication, New Delhi.
3. Sharma, B.R. (1990) Firearms in Criminal Investigation and Trails.
4. Dimado (1987) Gunshot Wounds.
5. Kumar (1987) Forensic Ballistics in Criminal Justice.
6. Brian J. (2008) Handbook of Firearm and Ballistics Examination and Interpretation Forensic Evidence.
7. James Smyth Wallace (2008) Chemical Analysis of Firearms, Ammunition, and Gunshot Residue.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Advanced Forensic Physics & Forensic Voice Examination**			**L**	**T**	**P**
03. Course Code	**17100402**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to- **CO1:** Understand the forensic analysis of Fiber, Glass, Soil, Paints and Tool Marks. **CO2:**Know about Voice/Tape analysis. **CO4:** Know thePattern recognition and comparison. **CO5:** Students would be able to write forensic report on analysis of physical evidences.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: General Forensic Physics**				
Introduction to Forensic Physics: Nature, collection, preservation & forwarding of physical evidence for scientific examinations. Forensic Engineering: What is forensic engineering; Fire investigation; Industrial accidents; Traffic accident reconstruction; Transportation disaster investigation; Civil engineering investigation; Investigation report. Building Materials- Types of cement and their composition, Determination of adulterants, Analysis of Bitumen and road material, Analysis of cement mortar and cement concrete and stones. Forensic examination of electrical appliances/installations. Road Accidents- Examination of scene, Filaments examination, Examination of skid marks. Physics of Bloodstain Pattern Analysis (BPA): Introduction, Terminologies, Droplet Directionality from bloodstain patterns, Determination of Point of Convergence and Point of Origin. Impact spatter and mechanisms. Importance and Legal aspects of BPA						
Unit – 2	**Number of lectures = 7**	**Title of the unit**: **Glass, Soil, Paints and Fibres**				
Glass-Types of glass and their composition, Glass fracture analysis, Laboratory exercises include refractive index measurements using immersion methods and classical chemical and physical methods of analysis. Soil-Formation and types of soil, Composition and color of soil, Forensic examination of soil, Interpretation of soil evidence. Paints- Types of paint and their composition, Forensic examination of paints, Interpretation of paint evidence. Tool Marks- Types of tool marks, Class characteristics and individual characteristics, Lifting of tool marks, Examination. Resuscitation of Obliterated Numbers in Metal Surfaces- Theoretical and practical aspects						

of resuscitation. Fiber analysis: Forensic significance, Classification, Textile Fibers, Yarns, Fabric construction, Fabric characteristics, Microscopy characteristic, Birefringence, Fluorescence Microscopy, Colors in textile, Color Assessment, Chemical properties,Miscellaneous Clue Materials- Examination of strings/ropes, Wires/cables, Seals, Counterfeit coins, Gem Stones: Analysis of crystalline substances.

Unit – 3	**Number of lectures = 7**	**Title of the unit:Voice/Tape Authentication**

Voice/Tape Authentication: Introduction to human Voice, Nature of voice and production of speech, perception of voice and speech, speech signal processing & pattern recognition basic factor of sound in speech acoustic characteristics of speech signal, Voice as Evidence: Collection of evidence, Quality of evidence, type of evidence, speaker variability and simulation, Transmission and channel distortion, admissibility. Fourier analysis, frequency & time domain representation Of speech signal, analogue to digital signal and conversion, fast Fourier transform quantization, digitization and speech enhancement, analysis of audio & video signal for authenticity.

Unit – 4	**Number of lectures = 7**	**Title of the unit:Pattern recognition and comparison**

Introduction to the technique of pattern recognition and comparison. Speaker recognition and types of speaker recognition, procedures and methods, feature extraction, Future comparison. Speaker recognition by Listening (SRL), speaker recognition by visual comparison of spectrograms (SRS), Automatic speaker recognition (ASR), Interpretation of results. Recent Development of Computerized Speech Laboratory, Legal Aspects. Speaker profiling, Intelligibility Enhancement of audio recording, Transcription and analysis of disputed utterances, Authenticity and integrity examination of audio recordings.

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=_6WWV500q9E&list=PLFUoG3X5oC-yh6bJDCoIa4qnrUIX7f8Ej
2. https://www.youtube.com/watch?v=_6WWV500q9E
3. https://www.youtube.com/watch?v=scP7L6rgovk
4. https://www.youtube.com/watch?v=liaFRIRN8vM
5. tapeexpert.com/pdf/authenticationrecordings.pdf

12. Books Recommended

1. Forensic Examination of Fibres, Second Edition - Kindle Edition - Kindle eBook (Apr. 16, 2007) by Ichael Grieve.
2. Noon (2000) : Forensic Engineering Investigation.
3. Sharma, B.R. : Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
4. J A Siegel, P.J Saukko (2000) Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press
5. H. James, Wouldiam G. Eckert; (1999) Interpretation of Blood stain evidence at crime scene stuart Second edition, CRC Press.
6. Sharma, B.R. (1974) Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad.
7. Lundquest&Curry : Forensic Science, Vol I to IV, 1963, Charls C. Thomas, Illinosis, USA.
8. Saferstein (2000) Criminalistics, Prentice Hall Inc. USA
9. Caddy, B; Forensic Examination of Glass and Paint Analysis and Interpretation, CRC Press, New York, 2001.
10. Shaw, D; Physics in the Prevention and Detection of Crime, Contem Phys. Vol.17, 1976.
11. Saferstein, R; Forensic Science Handbook. Vol. I,II, (Ed.), Prentice Hall, New Jersey, 1988.
12. Working Procedure Manual; Physics BPR&D Publication, 2000.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Advanced Questioned documents & Digital Forensics**			**L**	**T**	**P**
03. Course Code	**17100403**			0	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		

08. Course Outcomes (COs):

The students will able to –

CO1: Compare handwriting and signatures, disguise and forgeries.
CO2: Explain Forensic stylistics and determine source of paper and ink samples.
CO3: Run forensic tools like Encase, SIMMI and FTK for retrieval of digital data from laptops, PCs and other storage devices etc.
CO4: They would also be able to answer the legal questions on computer/cybercrime.
CO5: Explain cyberspace, cryptography, encryption and their breakdown.

10. Unit wise detailed content

Unit-1	Number of lectures = 7	Title of the unit: Paper Examination

Examination of Paper: Types of Paper, Manufacture of Paper, Paper gsm, Testing of Paper, Nondestructive Tests, Destructive Tests, Comparison of Paper, Mechanical Fits, Watermarks, Dating of Paper, Envelopes, Writing Materials, Pencils, Inks, Liquid Inks, Ball-Point Inks, Fiber-Tipped, Roller Ball, and Gel Pens. Examination of Inks: Visual Examination, Examination of Color, Absorption Spectra and the Examination of Inks, Ultraviolet and Infrared Radiation, Detection of Infrared Radiation, Infrared Absorption, Ultraviolet Fluorescence, Infrared Luminescence, Comparison of Inks Using Infrared Luminescence, Erasures, Obliterations, Other Luminescence Effects, Destructive Techniques, Chromatography, Thin-Layer Chromatography, High-Performance Liquid Chromatography, Chemical Tests, Other Components of Ink, Further Techniques, Relative Aging of Ball-Point Inks, Dating of Inks.

Unit – 2	Number of lectures = 7	Title of the unit: Handwriting

Handwriting: Accidental Variation of Handwriting, Writing Instruments, Writing Position, Health of Writer, Guided Hand Signatures, Drugs and Alcohol, Impairment of Vision, Deliberate Variation of Handwriting, Disguised Writings, Difficulties of Disguising Writing, Disguised Signatures, Simulated Writings, Freehand Simulation, Slowly Made Simulations, Simulations of Poorly Made Signatures, Rapidly Made Simulations,

Traced Signatures, Introduction of Features of the Copier. Digital signature/writings and examination.

Forensic stylistics- Forensic linguistics, e-documents, digital signatures Opinion- Reporting to the court juxtaposed charts - evidence in the court- cross examination, Related Case Studies

Unit – 3	**Number of lectures = 7**	**Title of the unit:Digital Evidence**

Digital Evidence: increasing awareness of digital evidence, challenging aspects of digitalevidence, challenging aspects of cyber trail, forensic science and digital evidence, computer image verification and authentication, digital image watermarking and its application in forensic science, Various techniques for digital watermarking, Logical structures of the Microsoft operating system FAT file system, DOS and Windows boot process, How to recover deleted files, The significance and determination of the creation date and time.

Unit – 4	**Number of lectures = 7**	**Title of the unit:Digital signature and cryptography**

Digital signature and cryptography: signature in paper based society, Transfer of computer based documents, digital signature and authentication, digital signature generation and verification, certification of public keys, certification of authority. Passwords and encryption techniques: Importance of keeping a log, Explanation of passwords keys and hashes. Security using Cryptography: introduction, types of Cryptography, different types of ciphers like caeser cipher, mono alphabetic cipher, poly alphabetic cipher etc. Diffie- Hellman key exchange and key management protocols. Steganography: Introduction, History, Steganography types.

Seizure of computers: Preparations to be made before seizure, Actions at the scene, Treatment of exhibits, bitstream (exact copies) of the original media, Establishing a case in computer forensics, Computer forensic analysis within the forensic tradition, Investigation: Investigating on various imaging methods. Lay down the image provided onto a hard disk and provide a disk map of the suspect drive. Extraction of all relevant information from a hard disk. Instruction on the acquisition, collection and seizure of magnetic media. How to best acquire, collect or seize the various operating systems. Legal and privacy issues, Forensic examination procedures, Preparing and verifying forensically sterile storage media.

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=AxubbuQJ9LU
2. https://www.youtube.com/watch?v=eOfa0RrBxbI
3. https://www.youtube.com/watch?v=ilTMQU3_1GQ
4. https://www.youtube.com/watch?v=taladDGFgKM

12. Books Recommended

1. Kelly,J.S and Lindblom, B.S (2006) Scientific Examination of Questioned Documents, Taylor & Francis, New York.
2. Brunelle, R.L. and Reed, R.W (1984) Forensic Examination of Ink and Paper, Charles C Thomas Publisher, U.S.A
3. Nathan Clarke (2010) Computer Forensics.
4. Eoghan Casey BS MA (2001) Handbook of Computer Crime Investigation: Forensic Tools and Technology.
5. Marjie T. Britz (2003) Computer Forensics and Cyber Crime: An Introduction
6. Eoghan Casey (2009)Handbook of Digital Forensics and Investigation
7. Warren G. Kruse II and Jay G. Heiser (2001) Computer Forensics: Incident Response Essentials.
8. Robert C. Newman (2007) Computer Forensics: Evidence, Collection and Management
9. Eoghan Casey BS MA (2001) Handbook of Computer Crime Investigation: Forensic Tools and Technology.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Dissertation**			**L**	**T**	**P**
03. Course Code	**17100404**			0	0	6
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials =Nil**		**Practical = 6**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Students would be able to obtain practical knowledge in forensic physical specialization by conducting experimentation and field work in departmental laboratories or other recognized institutes where hand on practice and lab facilities would be available. **CO2:** It would strengthen their practical skills and bring additions to their academics by publishing the findings of their work.						

01. Name of the Department: Forensic Sciences						
02. Course Name	**Assignments & Seminars**			**L**	**T**	**P**
03. Course Code	**17100405**			0	2	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =		**Tutorials = 02**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Enhance the Communication skills and thorough knowledge on particular topics. **CO2**: Work and preparation on Assignments based on case studies.						

Specialization (Chemical Sciences)

<table>
<tr><td colspan="6">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Advanced Forensic Chemistry</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100406</td><td>2</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = 28</td><td colspan="2">Tutorials = Nil</td><td colspan="3">Practical = Nil</td></tr>
<tr><td colspan="7">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">The students will able to –

CO1: Reconstruct Arson.
CO2:Analyzed adulteration in petroleum products.
CO3:Identify illicit and licit liquors.
CO4:Perform Phenolphthalein in trap case.
CO5: Write forensic Report & present Court Room Testimony for chemical evidences.</td></tr>
<tr><td colspan="7">10. Unit wise detailed content</td></tr>
<tr><td>Unit-1</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit: Analytical Chemistry</td></tr>
<tr><td colspan="7">Introduction to Forensic Chemistry, branches of and cases involved in Forensic chemistry, preliminary and confirmatory methods used in Forensic chemistry. Analytical Chemistry: Nature and scope of analytical chemistry in Forensic chemical analysis, Concepts of Structure and function of drug molecules, Concept of Mole, Molecular Mass and Molecular Weight, Atomic Number and Atomic Mass, Classification of acids, bases and salts, pH value and pH scale, Buffer solutions, Oxidizing and reducing agents in organic chemistry, Functional group analysis, Schemes of identification of unknown solids, Volumetric/Titrimetric methods of analysis, Theory of indicators, Gravimetric methods of analysis, Process of precipitation, Saturated and supersaturated solution, Methods of sample preparation in organic and inorganic analytical chemistry. Chemical separation Techniques: Solvent extraction (Liquid-liquid extraction), Solid phase extraction, Solid phase micro extraction (SPME). Phenolphthalein in trap case: Chemistry and Forensic examination of Phenolphthalein used in Bribe trap cases, and related legal issues.</td></tr>
</table>

Forensic significance of Cosmetics: Introduction to cosmetics of forensic interest and their role in crime investigation, General Chemistry of Colorants, Dyes, Pigments & Polymers. Industrial Products: Physical and chemical examination of adulterated and non-adulterated oils and fats, Analysis of chemical fertilizers, consumer items such as gold, silver, tobacco, tea, sugar, salts. Corrosive chemicals: Hydrochloric acid, sulphuric acid, and nitric acid and alkalis' in crime exhibits of acid/alkali throwing cases.

Unit – 2	**Number of lectures = 7**	**Title of the unit**:**Fire and Arson**

Fire & Arson: Light and Flame, Chemistry of Fire, Combustion reaction, Fire Triangle, Fire Tetrahedron; Backdraft, Thermo-chemistry of Fire, Heat Capacity and Phase changes, Accelerants types of accelerants, Combustible and Flammable liquids, Flash point, Fire point, Ignition point, Auto Ignition point, vapour density, vapour pressure, Fire extinguisher. Arson: Legal Definition, Arson motives, Degrees of Arson, Forensic and legal Concepts, Determining origin and cause; Fire patterns, Collection/Preservation of Arson Evidences, Flashover, Backdraught, Live or dead at time of arson; Documenting the fire or crime scene. Scheme of analysis: Extraction of samples from debris (Direct and solvent extraction methods, Head Space method, SPME, Distillation), Clean-up (Filtration & Acid stripping), Analysis (GC, GC-MS, FTIR & SEM etc.), Interpretation of GC-MS spectra. Petroleum Products: Introduction to Petroleum Products, Properties and Testing of Petroleum and Petroleum Products, Adulteration of petroleum products as per Prevention of Malpractices in Supply and Distribution, Analysis of common petroleum products including, Petrol, Kerosene, Diesel, Lubricating Oil, Furnace Oil and Grease as per BIS specifications. Analysis of Dyes used in petroleum products, Chemical fingerprinting of petroleum products

Unit – 3	**Number of lectures = 7**	**Title of the unit:Explosives**

Explosives: Definition of Explosives, Definition as per Indian Explosive Acts. History of Explosives, Chemistry of explosives, Deflagration and Detonation phenomenon (Redox Chemistry, Kinetics-Molecular Theory of gases & Gas Laws), Characteristics of high and low explosives, Dust explosion, Gas/vapour explosion, BLEVE, Effect of blast wave on structures & human and Pyrotechnics. Improvised Explosive Device: Definition of IED, Components of IED, Explosives Initiation (Explosive Trains); Types (Molotov cocktail, Letter bomb, Pipe bomb, VBIED and CBRN), Detection of Hidden Explosives. Bomb Scene: Specific approach to scene of explosion, Reconstruction of sequence of events, Evaluation and assessment of scene of explosion, Analysis of Explosive: Pre-blast and Post blast residue collection, Systematic examination of explosives and explosion residues in the laboratory using chemical and instrumental techniques and interpretation of results.

Unit – 4	**Number of lectures = 7**	**Title of the unit:Liquors**

Liquors (Alcoholic beverages): Definition, classification of liquors based on origin (Indian Made Foreign Liquors, Country Made Liquors and Illicit Liquors), Fermented and Distilled methods (Pot Still and Continuous Still), Characteristics of Beer, wines and Whisky, Congeners in alcoholic beverages, Laws and penalties as per Excise/ Act. Laboratory methods of determination alcoholic strength, Forensic analysis of distilled and fermented liquors including illicit liquors.

Report Writing & Court Room Testimony: Evidence and testimony in court, Information required by the Forensic expert, Components of Forensic Reports, Preparation of Report, Presenting findings in a Report format.

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=EUrRpTJyHsg
2. https://www.youtube.com/watch?v=VF3-V4buOvs

3. https://www.youtube.com/watch?v=p694_czdTMY
4. https://www.youtube.com/watch?v=k5JjtOMQI_0
5. https://www.youtube.com/watch?v=5QoxLfhFJRA
6. https://www.youtube.com/watch?v=8q4_GYDHODk

12. Books Recommended

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. Mathew E. Johll (2009) Investigating Chemistry: A Forensic Science Perspective
7. Suzanne Bell (2009) Drugs, Poisons, and Chemistry
8. DFS Manuals of Forensic Chemistry and Narcotics.
9. A Naquest (1984) legal chemistry. a guide to the detection of poisons, examination of tea, stains, etc
10. DFS -Working Procedure Manual- Chemistry, Explosives
11. E. Stahl (1969) Thin Layer Chromatography: A Laboratory Handbook.
12. JehudaYinon; Forensic and Environmental Detection of Explosives
13. Saferstein (1976) Criminalistics.
14. Saferstien: Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA
15. YinonJitrin (1993)Modern Methods & Application in Analysis of Explosives, John Wiley & Sons ,England
16. J A Siegel, P.J Saukko (2000) Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Advanced Forensic Toxicology**			**L**	**T**	**P**
03. Course Code	**17100407**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Understand about the classification of poisons. **CO2:** Know about the Alcohol Intoxication & analysis. **CO3:** Explain Animal poisons **CO4:**Understand Gaseous Poisoning						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Toxicological analysis**				
Samples required in Toxicological analysis: Selection of Post-mortem samples and reference to particular class of poison, Classes of samples (Biological and Non-biological), Methods of sample collection (Living and Dead person), Classification of matrices, choice of preservatives, containers and storage conditions. Alternative specimens: Hair analysis, Drugs in oral fluid, Detection of drugs in sweat etc. Analysis of Exhumed and decomposed bodies.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**:**Alcohol Intoxication & analysis**				
Alcohol Intoxication & analysis: Related cases, Properties and types of Alcohols, Pharmacology, Toxic properties and effects of alcohol. Chemical tests for alcohol in blood and urine including Breath Alcohol Screening devices, Method of analysis of some alcoholic beverages in biological materials by chemical methods (Kozelka- Hine) and instrumental methods (GC), Legal context to drinking and driving. Format of Report Writing & Court Room Testimony: Information required by the Forensic toxicologist, Presenting findings in a Report format.						

Unit – 3	Number of lectures = 7	Title of the unit:Animal poisons
Animal Poisons: Insects and animal toxins and their examination, Composition of Snake venoms, Sites and mode of action, Effect on the body as a whole, and tests for identifications. Plant poisons: Classification and characteristics, method of extraction and stripping of plant poisons in matrices and analysis by chemical and instrumental techniques.		
Unit – 4	**Number of lectures = 7**	**Title of the unit:Gaseous Poisoning**
Gaseous Poisoning: Carbon Monoxide, Hydrogen Cyanide and Phosphine gas, significance, signs and symptoms, methods of diagnosis, tests for identification. Food Poisoning: What is food poisoning, Food poisoning due to chemical and bacterial, Sign and symptoms of food poisoning, collection and preservation of evidence material, extraction and isolation, from food material, Biological material, detection and identification by colour test and Instrumental techniques.		
11. Brief Description of self learning / E-learning component		
https://www.youtube.com/watch?v=VF3-V4buOvs https://www.youtube.com/watch?v=lbWHGxUdDD8 https://www.youtube.com/watch?v=__LIPm4hN-U https://www.youtube.com/watch?v=0ErO9DToa3k&list=PL_a1TI5CC9RGsxpFK6Hxg0jPO2ZlzLx38		
12. Books Recommended 1. A C Moffat Clarke's Analysis of Drugs and Poisons, (Formerly Isolation & Identification of Drugs) 3rd Ed. 2 Vol. Set. 2. Casarett& Doll Toxicology (2003) The Basic Science of poisons. 3. Clark, E.G.C. : Isolation and identification of Drugs, VI and Vol. II, 1966, 1975-1986. 4. Curry A.S (1986) Analytical Methods in Human Toxicology, Part II, CRC Press Ohio 5. Curry, A.S. (1976) Poison Detection in Human Organs. 6. Michael J. Deverlanko et al (1995) Hand Book of Toxicology CRC Press. 7. Morgan B.J.T (1996) Statistics in Toxicology, Clarendon Press, Oxford. 8. Modi, Text Book of Medical Jurisprudence Forensic Medicines and Toxicology (1999) CBS Pub. New Delhi. 9. Saferstien (1982) Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA.		

01. Name of the Department: Forensic Sciences						
02. Course Name	**Forensic Drug Analysis**			**L**	**T**	**P**
03. Course Code	**17100408**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Identify any type of drug of abuse by using different methods. **CO2:**Know about the working of clandestine laboratories and chemistry of designer drugs. **CO3:**Understand Drug abused in Sports and their analysis. **CO4:**Explain instruments like UV-vis,. TLC, IR/FTIR, NMR, GC-MS & HPLC/LC-MS.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Drugs**				
Drug: Definition of Drug, Drug Use & Misuse, Drug Chemistry, Drug Dependence and chemistry of Addiction, Drug Receptors and Brain Chemistry. Drugs of Abuse: Definition, Classification based on Form and Origin, Use, Effects and Schedules, Structure of NDPS Act and the definitions of each drug classification, Drugs as Evidence, Profiling Examples of Illegal Drugs, United Nations International Drug Control Programme.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**:**Chemistry and Analysis of Drugs of Abuse**				
Chemistry and Analysis of Drugs of Abuse: Origin, Pharmacology, Methods of preparation, Storage, Diluents and Adulterants, Sample Handling, Optimization of Experimental Conditions, Presumptive/Screening and Confirmatory Methods: Color/spot test, Microscopic examination, Microcrystalline tests, Thin-Layer Chromatography, Sample Preparation before TLC Specimen, Extraction Evaluation of TLC for Drug Screening, Immunoassay Methods, UV Spectrophotometry, IR/FTIR Spectrophotometry, NMR, GC-MS & HPLC/LC-MS, Legal Implications and Data Interpretation of Opium and Opioids analgesics, Stimulants (Cocaine, Amphetamine & other amphetamine derivatives), Depressants (Barbiturates and Benzodiazepines), Hallucinogens (Cannabis,						

LSD, Psilocybine and Mescaline), OTC, Inhalant and Volatile Substances, Drugs in sexual assault.

Unit – 3	**Number of lectures = 7**	**Title of the unit:Animal poisons**

Clandestine laboratory: Meaning and Definition of Clandestine, Clandestine Laboratory, Related Problems, Factors Contributing to Clandestine Drug Labs, Harms Caused by Clandestine Drug Labs, Equipment Needs: Reflux, Distillation, Hydrogenation, Bucket Chemistry, Extractions, Chemical Needs, Cooking Methods Commonly Used in Clandestine Drug Labs, Extraction Process, Conversion Process, Synthesis Process, Tableting. Designer drugs: Definition, Analogs of Fentanyl and Meperidine (both synthetic opioids), Phencyclidine (PCP), Amphetamines and methamphetamines (which have hallucinogenic and stimulant properties). Laboratory Analysis: The Chemist, Extractions: Physical Extraction, Dry Wash/Extraction, Liquid/Liquid Extractions, Analysis: Chemical Color Tests, Microscopic Techniques, Infrared Spectroscopy, Thin-Layer Chromatography, Ultraviolet Spectroscopy, Gas Chromatography. Format of NDPS Report Writing & Court Room Testimony.

Unit – 4	**Number of lectures = 7**	**Title of the unit:**Drug Abuse in Sports

Drug Abuse in Sports: Introduction, International Olympic Committee (IOC), World Anti-Doping Agency (WADA), classification of commonly prohibited substances and Performance enhancing Drugs, Steroids, Stack and Pyramid methods, Dope test and Blood Doping, Sampling techniques, analytical approaches.

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=abTAqmK8bIM
2. https://www.youtube.com/watch?v=gOaoueVSZpM
3. https://www.youtube.com/watch?v=dfJE4A6HQlI
4. https://www.youtube.com/watch?v=ZrGFyFnDPfA
5. https://www.youtube.com/watch?v=qzjG4o5Ixhg&list=PL_a1TI5CC9RGdJLhgo5s4VRuM0gRcqJdu
6. https://www.youtube.com/watch?v=mbu0FaAcMSs

12. Books Recommended

1. Clarke's Analysis of Drugs and Poisons, (Formerly Isolation & Identification of Drugs) 3rd Ed. 2 Vol. Set.
2. Clark, E.G.C. : Isolation and identification of Drugs, VI and Vol. II, 1966, 1975-1986.
3. Modi, Text Book of Medical Jurisprudence Forensic Medicines and Toxicology (1999) CBS Pub. New Delhi
4. Saferstien (1982) Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA.
5. DFS -Working Procedure Manual- Narcotics
6. E. Stahl (1969) Thin Layer Chromatography: A Laboratory Handbook.
7. Saferstein (1976) Criminalistics

<table>
<tr><td colspan="7">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Dissertation</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100409</td><td>0</td><td>0</td><td>6</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = Nil</td><td colspan="2">Tutorials =Nil</td><td colspan="3">Practical = 6</td></tr>
<tr><td colspan="7">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">The students will able to –

CO1: Students would be able to obtain practical knowledge in forensic physical specialization by conducting experimentation and field work in departmental laboratories or other recognized institutes where hand on practice and lab facilities would be available.
CO2: It would strengthen their practical skills and bring additions to their academics by publishing the findings of their work.</td></tr>
</table>

01. Name of the Department: Forensic Sciences						
02. Course Name	**Assignments & Seminars**			**L**	**T**	**P**
03. Course Code	**17100410**			0	2	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures =		**Tutorials = 02**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Enhance the Communication skills and thorough knowledge on particular topics. **CO2**: Work and preparation on Assignments based on case studies.						

Specialization (Biological Sciences)

<table>
<tr><td colspan="7">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Forensic Drug Analysis</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100411</td><td>2</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = 28</td><td colspan="2">Tutorials = Nil</td><td colspan="2">Practical = Nil</td></tr>
<tr><td colspan="7">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">The students will able to –

CO1: Understand the significance of botanical evidence to pinpoint a place/time of crime, clandestine graves.
CO2: Know the difference between ante and post-mortem drowning along with the bearing the diatoms and probable place and time of drowning.
CO3: Explain post-mortem interval, manner of death and the cause of death by using entomological evidence.
CO4: Understand the significance of Forensic serological techniques.</td></tr>
<tr><td colspan="7">10. Unit wise detailed content</td></tr>
<tr><td>Unit-1</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit: Botanical evidences</td></tr>
<tr><td colspan="7">Botanical evidences: Introduction, types, location, collection evaluation and forensic significance. Wood: Type of wood and their identification and comparison. Leaves & seed: Identification of various types of leaves and their anatomy, methods of comparison. Pollens: Structure, function, methods of identification and comparison.</td></tr>
<tr><td>Unit – 2</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit:Diatomology</td></tr>
<tr><td colspan="7">Forensic Diatomology: Nature, location, Structure and life cycle of diatoms, methods of identification and comparison, Diatom Monitoring and D-Mapping of water bodies, Extraction from water samples, Slide preparation and identifying features. Diatom Test: Ante-mortem and Post-mortem drowning, Diatom as a forensic evidence, Forensic significance of Diatom Test, Fate of Diatom inside the body, Extraction methods of diatoms from body, Criterion of Concordance,</td></tr>
</table>

Validity of Diatom test and its Limitations.

Unit – 3	**Number of lectures = 7**	**Title of the unit:Forensic Entomology**

Forensic Entomology: Introduction, general entomology and arthropod biology, insects of forensic importance, collection of entomological evidence during death investigations, the role of aquatic insects in forensic investigations. Insect succession on carrion and its relationship to determine time since death, Insect Applications to Medico-legal Entomology, Human Decomposition and Insect Succession, Factors that Influence Decomposition and Succession, Case Studies Involving Insect Succession.

Unit – 4	**Number of lectures = 7**	**Title of the unit:Serological Techniques**

Forensic Serology: Introduction, basic concepts- antigens, antibodies (Polyclonal and monoclonal), Affinity, avidity, Antigen-antibody binding reactions- primary and secondary. Serological Techniques: Primary binding assays (ELISA, Immunochromatographic assays), Secondary binding assays (Precipitation based assays- Immunodiffusion and electrophoretic methods for species Identification, Agglutination based assays-Direct agglutination assay, Passive agglutination assay).

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=G03zsVrZBS8
2. https://www.youtube.com/watch?v=taSCtCKVyRs
3. https://www.youtube.com/watch?v=4Mx1nYmNRNc
4. https://www.youtube.com/watch?v=ZaRyoVyGsl4
5. https://www.youtube.com/watch?v=wJJMmiu_ZKQ&list=PL_a1TI5CC9RGvmmAPrvLBEjatACmd88TQ
6. https://www.youtube.com/watch?v=MZTDjix4_Zw

12. Books Recommended

1. David W. Hall, Jason Byrd. Forensic Botany: A Practical Guide, Wiley-Blackwell, 2012.
2. Jason H. Byrd and James L. Castner (2001) Forensic entomology, CRC Press LLC.
3. Forensic Science Hand book by Richard saferstein Vol (II); Prentice Hall, Publications.
4. Robertson (1999) : Forensic examination of Hair. Francis & Taylor, USA.
5. Safersstein, R. (1982) Science Handbook; Vol. III, Prentice Hall, New Jersey.
6. Curry, A. S. (1965) Methods of Forensic Science, Vol. IV, Interscience, New Youk.
7. Chowdhuri, S. (1971): Forensic Biology, B P R & D Govt. of India.
8. Forensic Diatomology by M.S. Pollanen
9. Encyclopedia of Forensic Science, Wiley (2010)
10. Bar ris, H. and Hopkinson, D. A. (1976): Handbook of Enzyme, Electrophoresis, Elsevier, North, Holland, New York.
11. Boorman, K. E: Blood Group Serology, Churchill, and Lincolin, P. J. (1988)
12. Culliford, B. E. (1971), The examination and Typing of Blood Stains, US Deptt. of Justice, Washington.
13. Chowdhuri, S. (1971): Forensic Biology, B P R & D, Govt. of India.
14. Dunsfor d, I. and Bowley, C. (1967): Blood Grouping Techniques, Oliver & Boyd, London.

01. Name of the Department: Forensic Sciences						
02. Course Name	**Advanced DNA Profiling**			**L**	**T**	**P**
03. Course Code	**17100412**			2	0	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = 28		**Tutorials = Nil**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Students would be able to understand the basic concepts of human genetics. **CO2:** They would be able to understand the usefulness of genetic markers in forensic investigation along with the interpretation of a DNA profile. **CO3:** Students would be able to understand the need, progress, forensic significance and the legal importance of DNA profiling in various scenarios in India and abroad. **CO4:** They would be able to understand the potential Benefits of DNA Data banking. **CO5:** Students would be able to Use DNA statistics for calculations in different types of cases encountered in Forensic Science.						
10. Unit wise detailed content						
Unit-1	**Number of lectures = 7**	**Title of the unit: Botanical evidences**				
Human Genetics, Heredity, Alleles, Mutations and Population Genetics, The concept of Genetics, polymorphism, Hardy-Weinberg Law.						
Unit – 2	**Number of lectures = 7**	**Title of the unit**:**Diatomology**				
DNA Profiling: Introduction, History of DNA Typing, molecular biology of DNA, variations, polymorphism, DNA Extraction-Organic and Inorganic extraction, Comparison of Extraction methods, Commercial kits DNA typing systems- RFLP analysis, PCR amplifications, sequence polymorphism. Analysis of SNP, YSTR,						

Mitochondrial DNA, Ancient DNA typing, Evaluation of results.

Unit – 3	**Number of lectures = 7**	**Title of the unit:Forensic Entomology**

DNA Statistics: frequency estimate calculations, interpretations, allele frequency determination, Paternity/Maternity index, Sibling index, Probability of match. Human Genome Project: Introduction, History, Goals, Benefits, Social, Ethical and Legal Issues DNA Forensic Databases, Ethical, Legal, and Social Issues Associated with DNA Data banking, Potential Benefits of DNA Data banking Quality control, certification and accreditation.

Unit – 4	**Number of lectures = 7**	**Title of the unit:Serological Techniques**

Forensic Significance of DNA profiling: Applications in disputed paternity cases, child swapping, missing person's identity- civil immigration, veterinary, wildlife and agriculture cases, legal perspectives- legal standards for admissibility of DNA profiling, procedural and ethical concerns, status of development of DNA profiling in India and abroad. New and future technologies: DNA chips, SNPs and limitations of DNA profiling.

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=_tKIvJ8UHrg
2. https://www.youtube.com/watch?v=ffn3eJMoCOk
3. https://www.youtube.com/watch?v=0M8PcgTORwg
4. https://www.youtube.com/watch?v=YqWfFGEXVJA
5. https://www.youtube.com/watch?v=W_S-QoS3w98
6. https://www.youtube.com/watch?v=z5OMOKr4pHQ
7. https://www.youtube.com/watch?v=CNqGkYsTufo
8. https://www.youtube.com/watch?v=3SXoyjOuEUo

12. Books Recommended

1. Saferstein, R. (1982) Science Handbook, Vol. I, II, & III, Prentice Hall New Jersey.
2. Kirby : DNA Fingerprinting Technology.
3. DNA structure and functions by Richard R. Sinden; Academic Press, Inc. 1994.
4. DNA Profiling and DNA fingerprinting (1999) Edited by Jorg T. Epplen and Thomas Lubjuhn; BirkhauserVerlag, Switzerland.
5. Forensic DNA Profiling Protocols (1998) Patrick J. Lincoln and Jim Thomson; Humana Press, Inc.
6. DNA and other Polymorphism in Forensic Science (1990) Henry C. Lee and R.E. Gaensslen; Year book Medical Publishers, Inc.
7. Keith In man and Norah Rudin (1997) An Introduction to Forensic DNA Analysis, CRC Press; Ny.
8. Koblinsky et al. (2005) DNA -Forensic and Legal Implications.
9. John M. Butler (2005) Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers Academic Press.

<table>
<tr><td colspan="7">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Advanced Forensic Anthropology</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100413</td><td>2</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = 28</td><td colspan="2">Tutorials = Nil</td><td colspan="3">Practical = Nil</td></tr>
<tr><td colspan="7">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">The students will able to –

CO1:Identify human bones and their forensic significance in determining Age, Sex, Race and Stature of deceased.
CO2:Make use of Portrait Parle/Bertillon system, Somatoscopy and Somatometry, Forensic Facial Reconstruction in elucidating the personal identification of humans.
CO3: Appreciate the practicability of Forensic Odontology
CO4: Compare Bites marks in solving crime cases.</td></tr>
<tr><td colspan="7">10. Unit wise detailed content</td></tr>
<tr><td>Unit-1</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit: Physical Anthropology</td></tr>
<tr><td colspan="7">Forensic Physical Anthropology: Definition and Scope within the medical-legal context of personal identification of human remains as in cases of homicides or mass disasters, Brief introduction to Forensic Archeology and Anthropometry. Human skeletal system: Nature and formation of bones, introduction to Human skeleton.</td></tr>
<tr><td>Unit – 2</td><td colspan="2">Number of lectures = 7</td><td colspan="4">Title of the unit:Bones</td></tr>
<tr><td colspan="7">Classification of human bones. Determination of Age and sex from human bones. Determination of Race and</td></tr>
</table>

estimation of stature from skeletal remains. Personal Identification: Portrait Parle/Bertillon system, Somatoscopy and Somatometry.

Forensic Facial Reconstruction: Two Dimensional and 3 Dimensional Methods, Importance of tissue depth to reconstruct various facial features.

Unit – 3	**Number of lectures = 7**	**Title of the unit:Forensic Odontology**

Forensic Odontology: Development and scope, role in mass disaster and anthropology, structural variation in teeth (human and non-human), types of teeth and their functions. Determination of age from teeth: Eruption sequence, Gustafson's method, dental anomalies, their significance in personal identification.

Unit – 4	**Number of lectures = 7**	**Title of the unit:Bite Marks**

Bite marks: Forensic significance, collection and preservation of bite marks, photography of bite marks, and evaluation of bite marks, Legal aspects of Bite marks.

11. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=wW5dA-ly64o
2. https://www.youtube.com/watch?v=wh1tJ1xu8_M
3. https://www.youtube.com/watch?v=XNmoqcbZTfs&list=PL_a1TI5CC9REcMswHEYutPo8oiJ-UHiWg
4. https://www.youtube.com/watch?v=DU7M59qeQP8&list=PL_a1TI5CC9RGgLogyQ_X-qDvYduore_rw
5. https://www.youtube.com/watch?v=Z34Xvqd3LjE
6. https://www.youtube.com/watch?v=9Z84bOxBbGU
7. https://www.youtube.com/watch?v=t4DgS-kQslI
8. https://www.youtube.com/watch?v=thQnQKiU4ik

12. Books Recommended

1. Forensic Dentisty (1999) Paul G. Stimson, Curtis A. Mertz; CRC Press, LLC.
2. Craniofacial Identification in forensic Medicine, edited by John. G Clement and David. L. Ranso; Oxiford University, Press; 1998.
3. Beals, R.L. and Hozier, H. (1985): An Introduction to Anthropology, Macmillan, New Delhi.
4. Krogman, W.M. And Iscan, M. (1987): Human Skeleton in Forensic Medicine, Charles & Thomas, U.S.A.
5. Gray's Anatomy (1987): Churchill Livingston, Edinburgh.
6. Taylor (2000) : Forensic Art and Illustrations CRC Press.
7. Singh, I.P. and Bhasin M. K. (1968): Anthropometery, Kamla-Raj Publications, Delhi.
8. Beals, R.L. and Hoizer, H. (1985): An introduction to Anthropology, Macmillan, New Delhi.
9. Alan Gunn (2009) Essential Forensic Biology, 2nd Edition

<table>
<tr><td colspan="6">01. Name of the Department: Forensic Sciences</td></tr>
<tr><td>02. Course Name</td><td colspan="3">Dissertation</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>03. Course Code</td><td colspan="3">17100414</td><td>0</td><td>0</td><td>6</td></tr>
<tr><td colspan="2">04. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>05. Pre-requisite (if any)</td><td></td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="6">06. Total Number of Lectures, Tutorials, Practicals</td></tr>
<tr><td colspan="2">Lectures = Nil</td><td colspan="2">Tutorials =Nil</td><td colspan="3">Practical = 6</td></tr>
<tr><td colspan="6">08. Course Outcomes (COs):</td></tr>
<tr><td colspan="6">The students will able to –

CO1: Students would be able to obtain practical knowledge in forensic physical specialization by conducting experimentation and field work in departmental laboratories or other recognized institutes where hand on practice and lab facilities would be available.
CO2: It would strengthen their practical skills and bring additions to their academics by publishing the findings of their work.</td></tr>
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01. Name of the Department: Forensic Sciences						
02. Course Name	**Assignments & Seminars**			**L**	**T**	**P**
03. Course Code	**17100415**			0	2	0
04. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
06. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = 02**		**Practical = Nil**		
08. Course Outcomes (COs):						
The students will able to – **CO1:** Enhance the Communication skills and thorough knowledge on particular topics. **CO2**: Work and preparation on Assignments based on case studies.						