UG. Forensic Science(4 Years Honors)
CBCS - 2020-21

B.Sc
Forensic Science

Syllabus and Model Question Papers

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Note: BOS is to provide final soft copy in PDF and word formats and four copies of hard copies in bounded form to the office of Dean Academic affairs.

1. Resolutions of the Board of Studies

Meeting held on: 22/01/2021.Time: 10:00 AM
At: Adikavi Nannaya University, NTR Convention Centre, Rajamahendravaram.

Agenda: Revision of Syllabus of B.Sc. Forensic Science, as per the guidelines and model curriculum provided by APSCHE for implementation from 2020-21 admitted batches.

Members present:

BOS-Chairman: Dr. D. Kalyani, Asst. Professor,
ANUR Members: Mr. E. Mohan, Principal, Aditya Degree College

Resolutions:

The Board of Studies members of B.Sc. Forensic Science thoroughly discussed on Forensic Science course structure, framing of syllabus, eligibility of students, qualifications of teachers and career prospects of the students.

The following were the resolutions made in the meeting. It was resolved

1. It was resolved to adopt revised common programme structure as per the guidelines issued by APSCHE.
2. Resolved to adopt regulations and scheme of examinations and marks/grading system of the university UG-Programmes.
3. Resolved to prepare model question Courses in the given prescribed format.
4. Resolved to prepare a list of equipment/software required for each Lab/Practicals.
5. Resolved to give the eligibility criteria for students for joining the course.
6. Resolved to give the eligibility criteria for faculty for teaching the course.
7. Resolved to prepare a list of Course setter/Course evaluators/project evaluators in a given format

2. DETAILS OF COURSE TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Week (Science:4+2)	Credits (Science:4+1)	Max. Marks Cont/Internal /Mid Assessment	Max. Marks Sem-end Exam
I	1	Introduction to Forensic Science & Criminology	T	4	4	25	75
		Forensic Science Lab	L	2	1		50
II	2	Crime Scene Management	T	4	4	25	75
		Crime Scene Management Lab	L	2	1		50
III	3	Questioned Documents & Finger Impressions	T	4	4	25	75
		Questioned Documents & Finger Impressions Lab	L	2	1		50
IV	4	Forensic Biology & DNA Fingerprinting	T	4	4	25	75
		Forensic Biology & DNA Fingerprinting Lab	L	2	1		50
	5	Forensic Chemistry & Ballistics	T	4	4	25	75
		Forensic Chemistry & Ballistics Lab	L	2	1		50

Note: *Course type code: T: Theory, L: Lab,

a. Proposed combination subjects: Chemistry & Cyber Forensics

b. Student eligibility for joining in the course:
Intermediate Examination (10+2) with Botany or Zoology or Mathematics and Chemistry
OR
12th Standard (ICSE/CBSE with Science group)

c. Faculty eligibility for teaching the course:
M.Sc. in Forensic Science with minimum 60% or above in Forensic Science subjects (Minimum qualification); Ph.D. is desirable.

d. List of Proposed Skill enhancement courses with syllabus, if any

e. Any newly proposed Skill development/Life skill courses with draft syllabus and required resources.

f. Required instruments/software/ computers for the course:
(Lab/Practical course-wise required i.e., for a batch of 15 students)

Sem. No.	Lab/Practical Name	Names of Instruments/Software/ computers required with specifications	Brand Name	Qty Required
1	Introduction to Forensic Science & Criminology	NA	NA	NA
2	Crime Scene Management	Digital Camera &Crime Scene Simulations General Crime Scene kit, Fingerprint kit, Casting kit, Various light sources	Nikon/Canon	4
	Questioned Documents & Finger Impressions	TLC, VSC,RUVIS,ESDA, Iodine Fuming Chamber, Cyanoacrylate Fuming Chamber, Fingerprint Development Powders	Regula/F&F/ Projectina F&F	1
3	Forensic Biology & DNA Fingerprinting	UV- Spectrophotometer, PCR, Stereo Microscope, Compound Microscope, Comparison Micrscope, Human Skelton, RFLP Kit	Schimadzu / Thermo/ Leica/ Olympus Magnus/Lawrence & Mayo Analytica/ Leica/Olympus	2
4	Forensic Chemistry & Ballistics	Stereo Microscope, Comparison Microscope, TLC,		

g. List of Suitable levels of positions eligible in the Govt./Pvt. organizations
Suitable levels of positions for these graduates either in industry/govt. organization like., technical assistants/ scientists/ school teachers., clearly define them, with reliable justification

S.No	Position	Company/ Govt. organization	Remarks	Additional skills required, if any
1	Scientific Assistant	CFSL/State FSL/ Regional FSL/CDTI	Upgrade their skills and get promoted	Communication skills Language skills Computational skills
2	Crime Scene Officer	Clues Team/ Crime Spot	,,	,,
3	Lab Assistant	CFSL/State FSL/CDTI	,,	,,
4	Cyber Crime analyst	CFSL/State FSL	,,	,,
5	Record Assistant	State or District Crime Records Bureau	,,	,,
6	Lab Technician	Chemical Examiner's Laboratory	,,	,,
7	Forensic Faculty	Police Academies		
8	Forensic Faculty	Central Detective Training Institutes		
9	Cyber Expert	Cyber Security		
10	Cyber Security Expert	IT Companies		
11	Forensic Consultant	Forensic Consultancies		
12	Document Expert	Banks		

h. List of Govt. organizations / Pvt. companies for employment opportunities or internships or projects

S.No	Company/ Govt organization	Position type	Level of Position
1	Central / State FSLs	Intern/Project Assistant	Basic (can be upgraded)
2	FPB/NCRB	Intern/Project Assistant	Basic (can be upgraded)

i. Any specific instructions to the teacher /Course setters/Exam-Chief Superintendent:
Course setter may strictly follow the syllabus and blue print of question Course while setting the Course.

Course evaluators may strictly follow the scheme of evaluation.

3. Program objectives, outcomes, co-curricular and assessment methods

B.Sc.	**Forensic Science**

1. Aim and objectives of UG program in Subject:

   a. Students will understand history of forensic science, development and its role in criminal investigation.
   b. Application of a computer to everyday tasks using standard procedures
   c. Need to effectively protect and process various physical evidences at SoC
   d. Documents and finger impressions can be used for the identification of culprit.
   e. How to protect ourselves from various kinds of cyber attacks
   f. Importance of biological evidences encountered in crime scene investigation.
   g. Applications of Chemistry and Ballistics for criminal investigation
   h. Investigation techniques, requirement and analyzing of digital evidences are covered.
   i. Mobile devices and its analysis in solving the crimes.

2. Learning outcomes of Forensic Science :
   After successful completion of B.Sc. Forensic Science, students will be able to answer the importance of forensic science in solving the crimes through the scientific investigation of crime scene and analysis of various physical evidence including digital evidence.

3. Recommended Skill enhancement courses: (Titles of the courses given below and details of the syllabus for 4 credits (i.e., 2 units for theory and Lab/Practical) for 5 hrs class-cum-lab work

4. Recommended Co-curricular activities: (Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

   A. Measurable:
      1. Assignments on: Crime Scene Management, Questioned Documents & Finger Impressions
      2. Student seminars (Individual presentation of Courses) on topics relating to: Cyber Security, Digital Forensics, Mobile Forensics
      3. Quiz Programmes on: Forensic Biology & DNA Fingerprinting, Chemistry & Toxicology
      4. Individual Field Studies/projects: Crime Scene Management
      5. Group discussion on: Digital Forensics, Mobile Forensics
      6. Group/Team Projects on: Crime Scene Management, Questioned Documents & Finger Impressions, Forensic Biology & DNA Fingerprinting, Chemistry & Toxicology, Cyber Security, Digital Forensics, Mobile Forensics

   B General
      1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
      2. Group Discussions on: Crime Scene Management, Digital Forensics, Mobile Forensics
      3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
      4. Any similar activities with imaginative thinking.

5. Recommended Continuous Assessment methods: Workshops, Conferences & Course presentations to be conducted regularly.

DETAILS OF COURSE-WISE SYLLABUS

4. Details of course-wise Syllabus

B.Sc.	Semester: I	Credits: 4
Course: 1	Introduction to Forensic Science & Criminology	Hrs/Wk: 4

Aim and objectives of Course: Students will understand history of forensic science, development and its role in criminal investigation.

Learning outcomes of Course: After studying this course the students will know-

- The significance of Forensic Sciences to the Criminal Justice System.
- The working conditions of Forensic Science Laboratory.
- The importance of criminology and penology for crime detection.
- The working of Indian courts and role of criminal justice system in crime detection.

UUNIT I:

Forensic science- Introduction – History & Development in India & Worldwide. Basic terminology. Principles of Forensic science with Examples - Allied institutions - CFPB, BPR&D, CDFD, CDTI, NIA, CCMB, LaCONES, IICT, NIN, NCB. Different agencies involved in Crime Detection- History-Development of- Police, Central Bureau of Investigation (CBI), Crime Investigation Department (CID), Intelligence Bureau (IB), Research & Analysis Wing (RAW), CRPF, BSF, SPG etc.

Forensic Science Laboratories - DFSS, SFSL, CFSLs. Various Divisions of FSLs- Functions and types of cases dealt in various divisions, ISO-17025, NABL Accreditations, etc. Opinion/ Reports from FSL's.

UNIT II:

Criminal Justice System in India- Introduction, Administration of Civil and Criminal Laws. Introduction to constitution of India- Fundamental Rights, Indian Penal Code (IPC), Criminal Procedure Code (Cr. PC), Indian Evidence Act (IEA), IT Act-2000, Wild Life Protection Act-1972, POCSO Act, etc. Indian Courts- Introduction, Hierarchy of courts- Powers of courts, types of courts, Lok Ayukta & Lok Adalat, etc. Role and responsibilities of Public Prosecution – Defense Council -Admissibility of Expert Testimony.

UNIT III:

Instrumentation: Introduction, Working Principle & Applications of various Instruments / Techniques used in Forensic Science – TLC, HPLC, GC, GC-MS, LC-MS, Microscopes-Stereo, Comparison, SEM, TEM, VSC, RUVIS, AAS, AES, EMR, Cyanoacrylate Fuming Chamber, Iodine Fuming Chamber, UV-Spectrophotometer, PCR, etc.

UNIT IV:

Criminology – Introduction - Definitions, Development and Scope of Criminology. Crime – Definitions, Characteristics and Classification of Crime: Classification by Pioneers, Classification under law: IPC. Professional & Organized Crime: Characteristics and Types.

Penology- Introduction- Punishment: Definition, Types and Theories of Punishment. Institutional system of correction: Prison – types, Functions – Prison Labor, Prison Education and Prison Discipline. Non-Institutional system of correction: Probation & Parole - Principles, advantage & Limitation. Victimology: Definition, Historical developments. Classification of Victims, Victimizing factors & Restitution.

UNIT V:

Criminal Psychology: Introduction, Definition & Scope. Mc. Naughten Rule, Insanity in IPC, Sensation and Perception. Gestalt principle of perceptual process. Personality – definition, traits and approaches. Freuds psychoanalytical theory. Personality disorders, delusional disorder, anti-social personality. Psychological Motives and its impact on behavior. Mental disorder and Mental deficiency as factor in the causation of Crime. Psychological methods of control and rehabilitation of offenders – Psychotherapy and counselling – Victims, Witnesses and Suspects. Polygraphy, Narcoanalysis& BEOS in the Criminal Justice System.

REFERENCE BOOKS:

1. Forensic Science in Criminal Investigation in trials – B.R.Sharma
2. Forensic Science in Criminal Investigation – Dr. (Mrs) Rukmani Krishnamurthy
3. Encyclopedia of Forensic Science Vol I, II& III, - Siegel.J.A , Sukoo.R.J and Knufer
4. Forensic Science: Advanced investigations, Cengage learning – Brown & Davenport.
5. Criminology The basics – Taylor & Francis – SandraWalklate
6. Criminology – Ram Ahuja
7. Criminal major acts – Padala Rama Reddi – Asian law house 27thedition
8. The Indian Penal code. 28th edition – Rattan lal and Dhirajlal
9. Forensic Science, Its Techniques & Court Evidence
10. An Interdisciplinary Approach to Forensic science – Dr. Praveen Kumar Janjua, Dr. G.Sunil Babu , Dr.Navjot Kaur Kanmai
11. Challenges to Internal Security of India – Ashok – Spectrum Publications

Suggested Co-Curricular Activities:

- Visit to FSL and Allied institutions.
- Quiz and seminars on Forensic Science.
- Jurisdiction & Powers of various courts in India.
- Study projects on instruments & techniques used in Forensic Science.
- Debate on Criminology & its importance
- Case studies and assignments on criminal psychology.

B.Sc.	Semester: I	Credits: 1
Course: 1	Forensic Science Lab	Hrs/Wk: 2

List of Experiments:

1. Experiments on Locard's principle of Exchange
2. Experiments on working principle of TLC, HPLC, GCMS, VSC, RUVIS.
3. Case studies - Civil and Criminal cases
4. Demonstration of Instruments and specimens
5. Internal – External locus of control scale

a. Self – Concept Questionnaire.

B.Sc.	Semester: II	Credits: 4
Course: 2	**Crime Scene Management**	Hrs/Wk: 4

Learning objectives: Crime scene is the key point for the entire investigation and this course emphasizes the need to effectively protect and process various physical evidences.

Outcomes: After studying this Course the students will know-.

- The importance of protection of crime scene.
- The significance of photography and videography at scene of crime.
- The importance of physical evidences.
- The Integrity of chain of custody.
- The role of crime scene reconstruction in crime investigation.

UNIT I:
Crime Scene- Definition, Types- Primary, Secondary & Tertiary. Crime scene safety: Golden rules, Types of hazards- Biological & Chemical. General precautions- Personal protective equipment. Processing of Crime Scene- Where, What & How to search. Search Methods – Strip/ Lane, Spiral, Wheel/Radial, Zone, Methods, etc.

UNIT II:
Crime Scene Photography & Sketching: Introduction, History -cardinal rules, Basic principles– Macro & Micro Photography- Forensic photogrammetry Variations of Photography- Mid range, Close-up, Aerial & over all Photography – EMR photographic techniques – SWGIT – Photo images as evidences – Documentation of Crime scene Photography – Forensic Videography. Sketching of Crime Scene- Rough Sketch & Fine Sketch- Rectangular Coordinate Method, Polar method, Baseline Method, Triangulation Method etc. optical methods of mapping, 3D laser Scanning.

UNIT III:
Physical Evidence- Definition, Importance, Types – Biological, Chemical, Digital Evidence and their handling- Identification of Physical Evidence - Trace Evidence. Type of information to be elicited from various types of Physical Evidence. General precautions while collecting Physical Evidence– Evidence collection equipments, techniques. Chain of Custody of Physical Evidence.

UNIT IV:
Packing Materials of Physical Evidence, Importance of Packing & Packing Materials. Sealing, Marking, & labelling of various physical evidence, Letter of Advice, Precautions while transporting Physical Evidence. General precautions - Types of Preservatives for various Physical Evidence- Biological, Chemical & Digital Evidence, etc.

UNIT V:
Crime Scene Reconstruction- Definition – Nature & Importance - Types of Crime Scene Reconstructions - Role of pattern analysis in reconstruction - Blood stain pattern, Glass fracture pattern, Fire burn or smoke patterns, Gait Pattern, Tyre impression patterns, Furniture pattern. Sequence of events – Recording, Documentation required for Crime Scene Reconstruction. CAD etc.

REFERENCE BOOKS:

1. Criminal Investigation - Karen M Hess & Christine Hess Orthmann.
2. Techniques of Crime Scene Investigation - Barry A.J. Fisher.
3. Criminal Investigation: The Art & the Science - Michael D.Lynn
4. Forensic Science in Criminal Investigation in trials – B.R.Sharma
5. Crime Scene Management – Dr.M.S.Rao & Dr.B.P.Mathil
6. Forensic Science in Criminal Investigation – Dr. (Mrs) Rukmani Krishnamurthy
7. Encyclopedia of Forensic Science Vol I, II & III, - Siegel. J. A, Sukoo. R. J and Knufer
8. Physical Evidence – Lee – Elsevier 2000
9. Forensic science: Advanced investigations, Cengage learning – Brown &Davenport.
10. Criminalistics – An introduction to Forensic science 5th edition –Saferstein
11. Introduction to criminalistics: Foundation of Forensic science – Elsevier2009
12. Interdisciplinary Approach to Forensic science – Dr. Praveen Kumar Janjua, Dr. G.Sunil Babu , Dr.Navjot Kaur Kanmai
13. Forensic Digital Photo Imaging – PatrickJones.
14. Crime Scene Photography – Robinson 3rded
15. The Practical Methodology of Forensic Photography – Red Sicker.D.R – CRCPress

Suggested Co-Curricular Activities:

- Flow chart preparation-Crime scene investigation
- Poster making –Photographic skills
- Seminar on crime scene management
- Collection of samples-for museum
- Simulation of various crime scenes
- Workshop on crime scene sketching techniques

B.Sc.	Semester: II	Credits: 1
Course: 2	**Crime Scene Management Lab**	Hrs/Wk: 2

List of Experiments:

1. Search methods for the Identification of physical evidence.
2. Handling, Lifting & Packing of physical evidence.
3. Sealing, Labelling & Preservation of different physical evidence.
4. Methods for sketching the crime scene- Rough & Fine Sketch
5. Mapping techniques of crime scene- Baseline, Rectangular, Triangulation & Polar techniques.
6. Crime scene Photography
7. Mock crime scene analysis

B.Sc.	Semester: III	Credits: 4
Course: 3	Questioned Documents and Finger Impressions	Hrs/Wk: 4

Learning objectives: Documents and Finger impressions are very important areas in forensic field to investigate the crime in right direction. Documents and finger impressions can be used for the identification of culprit.

Outcomes: After studying this course the students will know-

- The significance of questioned document examination.
- The handwriting analysis and its importance in detecting the culprit.
- The various techniques used for examination of questioned documents.
- The role of fingerprints and poroscopy in crime investigation.

UNIT I:

Document Examination- Introduction, History & Development of Document examination. Classification of Documents- Questioned & Standard Documents. Various types of documents – Property, Educational, Security, Travel, Business or Financial transactions, etc. Types of documents in various crimes- Frauds in co-operative societies, Lottery tickets, Vigilance cell cases, Marks list, Passports, Chit fund frauds, R.C. books, Registered documents, Postal frauds, Insurance frauds, Threatening letters etc.

UNIT II:

Handwriting Examination–Definition, Development & Evolution of Handwriting. General & Individual characteristics of handwriting. Factors affecting handwriting, Principles of Handwriting. Disguised writing and anonymous letters. Comparison of Handwriting- Questioned writings, Standard writings -Admitted or Non-requested, Specimen or requested writings. Examination of signatures. Characteristics of forged and genuine signatures. Types of forgeries. Instrumentation and Principles of Electrostatic Detection Apparatus, Video Spectral Comparator, Stereomicroscope, TLC.

UNIT III:

Types of Frauds. Examination of alterations, erasures, over writings, additions and obliterations in various disputed documents. Decipherment of secret writings, indented writings and writings on charred documents. Examination of seals, impressions and mechanical impressions.

Examination of black and white, colour photocopies, carbon copies and fax messages- Examination of type writings, various printed documents-dot matrix, ink-jet and laser printers, electronic type writers, security documents, Security features of currency notes. Examination of counterfeit currency, passports, visa, stamp Courses, postal stamps etc.

UNI IV:

Fingerprints-History, Evaluation and Contributions to fingerprint science - Galton, Herschel, Faulds Henry, Aziz-ul-Haque and Hema Chandra Bose. Poroscopy & Edgeoscopy, Classification of Fingerprint Patterns, Systematic methods of classification of Fingerprints. Types of Fingerprints- Visible, Plastic, & Latent. Development of Latent Fingerprints by Physical, Chemical & Modern methods. Recording & lifting of Fingerprints -Collection of Fingerprints at Scene of crime, from Victims, Suspects andCadavers.

UNIT V:

Papillary ridge, methods of comparison of papillary ridges, need of comparison and marking of ridge characteristics in identical and non-identical prints. Ridge counting and tracing. Computerization of Fingerprints- Evolution & History of AFIS, FACTS, Modern AFIS Manual Fingerprint and AFIS; live scanner (FED) and AFIS comparison. Advantages of AFIS, NIST & WSQ standards.

REFERENCE BOOKS:

1. Cross Examination of handwriting Expert – B.Lal & R.Chandra
2. Forensic Science in Criminal Investigation in trials – B.R.Sharma
3. Scientific Examination of Documents Methods and techniques – David Ellen _ 3rded
4. Forensic Document examination: Fundamentals & Current Trends – Jane A.Lewis
5. The Problem of Proof – A.S.Osborn – Universal Law
6. Typewriting Identification ISQD – Thomas CC – Billy Prior Bates1971
7. Suspect Documents: Their Scientific Examination, Universal Law Publishers
8. Forensic Handwriting Identification Fundamental Concepts and Principles – Morris, Ron – Academic Press.
9. Biometrics & Fingerprint Analysis – Mrs. Indira Sudha
10. Fingerprints Analysis & Understanding– Mark Hawthorne
11. Graphology & Fingerprinting – Gupta & Agarwal.
12. Fundamentals of Fingerprint Analysis- Hillary Moses Daluz

Suggested Co-Curricular Activities:

- Assignments on questioned documents examination
- Visiting of Course Manufacturing companies
- Collection of various types of inks
- Seminars on latent finger print development
- Crime scene visit for latent finger prints on various objects
- State Finger Print Bureau visit

B.Sc.	Semester: III	Credits: 1
Course: 3	Questioned Documents and Finger Impressions Lab	Hrs/Wk: 2

List of Experiments:

1. Detection of types of Forgeries.
2. Examination of rubber stamps and seals.
3. Examination of Printed Material
4. Examination of Alterations, Additions, Erasures, Obliterations and over writings by VSC.
5. Deciphering of indented writing, secret writing and charred documents
6. Examination of inks by TLC.
7. Examination of inks & Course by VSC
8. Examination of security features in Currency notes, Passports, Visas, Stamp Courses, Educational certificates, Driving License by VSC.
9. Development of Finger prints by Physical & Chemical methods
10. Lifting of developed Latent Fingerprints
11. Collection of Plain & Rolled Fingerprints

B.Sc.	Semester: IV	Credits: 4
Course: 4	Forensic Biology & DNA Fingerprinting	Hrs/Wk: 4

Learning objectives: Understand the importance of biological evidences encountered in crime scene investigation.

Outcomes: After studying this course the students will know-

- The various techniques used for examination of biological evidences.
- Applications of entomology in death investigation
- Importance of Wildlife Forensics in Wildlife Protection and Conservation
- Forensic examination of bodily fluids of human body
- DNA fingerprinting technology in crime investigation.
- Laws related to DNA technology in India and other countries.

UNIT I:

The Cell Theory, Structure of Prokaryotic & Eukaryotic cells (Plant & Animal), Structural organization and functions of plasma membrane and cell wall. Cell-organelles and cytoskeletal elements (Microtubules, microfilaments and intermediate filaments); Biomolecules – Proteins (Amino acids, Enzymes), Nucleic acids, Carbohydrates, Lipids; Minerals & Vitamins.

Immunity: Definition, Types: Innate - physical & chemical barriers, Acquired, Active, Passive. Immunogens & Antigens - Definition, types of antigens, factors influencing antigenicity; Antibody - Definition, structures, types, properties and functions of immunoglobulin. Antigen - Antibody Reactions –Agglutination & Precipitation.

Human Physiology: Introduction to Nervous system, Respiratory system, Circulatory system, Endocrine system, Excretory system & Digestive system

UNIT II:

Biological Evidence – Nature, Importance and Identification of Blood, Semen, Vaginal fluids, Saliva, Urine, Feces, Sweat, Skin, Nails, Tissues, Tooth, Bones, Uterine fluids, Vomit, Vitreous humor, CSF, Colostrum.

Diatoms – Structure, Identification Tests & Importance. Hair – Structure & growth - Differences between human & animal hair. Fibre - Classification of fibres- Identification and comparison of fibres by Physical & Chemical methods - Forensic Significance.

Blood and its function, Composition of blood, Formation of Blood cells, Types of Blood cells and blood groups, (ABO systems & Rh factor).

UNIT III:

Wildlife Forensics – Importance, Wildlife Crimes - Smuggling & Poaching. Wildlife Products and articles – illegal possession. Organizations involved in Wildlife Protection & Conservation. Wildlife Protection Act- 1972- Important Schedules & Endangered Species.

Forensic Entomology: Introduction, importance. Life cycle of insects, Role of insects in decomposition of human body- collection of insects.

UNIT IV:

Basics of Genetics - Mendelian principles, Sex determination and Sex-linked inheritance Prokaryotic & Eukaryotic Genetic material: Discovery, Experiments, Composition and Structure of DNA & RNA, Organization of DNA in Chromosomes, DNA replication, Genetic code, Proteins synthesis, Introduction to recombinant DNA technology - its Forensic applications.

DNA isolation, Extraction methods – Phenol Chloroform, Chelation, Differential & Silica based. DNA Quantification – Slot blot Assay, FID Assay & PCR Amplification.

UNIT V:

DNA Separation techniques – Supporting matrices, Gel & Capillary Electrophoresis. Advances in DNA testing: VNTR, STR, STR multiplex, STR Polymorphism, SNPs, mtDNA, Y - chromosome analysis; DNA profiling and applications. Rapid DNA Testing. DNA Database & Databank – CODIS. Human Genome Project. Admissibility of DNA evidence in court of law. The DNA legislation-India, USA, UK. The DNA Profiling Regulation bill. Application of DNA Fingerprinting in Wildlife Forensics.

REFERENCE BOOKS:

1. Forensic Biology – Richard Li
2. Forensic DNA collection at Death Scenes - Rhonda Williams & RogerKahn
3. Forensic DNA Analysis: Current Practices and Emerging Technologies – Jaiprakash G. Shewale.
4. Forensic DNA Evidence Interpretation - Jhon S. Buckley on, Jo-Anne Bright, Duncan Taylor.
5. Forensic Biology - Dr. (Mrs) Rukmani Krishnamurthy, Sharikant H.Lade, Dr. Trupti Khedkar
6. Encyclopedia of Forensic Science Vol I, II & III, - Siegel.J.A , Sukoo.R.J and Knufer
7. Forensic Science in Criminal Investigation in trials – B.R.Sharma
8. Interdisciplinary Approach to Forensic science – Dr. Praveen Kumar Janjua, Dr. G.Sunil Babu , Dr.Navjot Kaur Kanmai
9. Forensic Science in Criminal Investigation – Dr. (Mrs) Rukmani Krishnamurthy
10. Criminalistics – An Introduction to Forensic science 5th edition –Saferstein
11. Statistical Methods in Human Population Genetics, ISI,1988 – Malhotra.K.C
12. An Introduction to Software tools for Biological Applications -Jambeck, P &Gibas.C
13. Bioinformatics Basics: Applications in Biological Sciences and Medicine - Rashidi, HH &Bueler.

Suggested Co-Curricular Activities:

- Seminars on wild life forensics
- Assignments on cell structure & cell organelles

B.Sc.	Semester: IV	Credits: 1
Course: 4	Forensic Biology & DNA Fingerprinting Lab	Hrs/Wk: 2

List of Experiments:

1. Serological Test – ABO Blood grouping
2. Identification tests for other bodily fluids.
3. Antigen - Antibody reactions – Agglutination and Precipitation
4. Identification of Diatoms & Pollen grains
5. Morphological Examination of Human Hair, Animal hair & Fibres
6. Isolation & Extraction of DNA from Blood
7. Gel electrophoresis of DNA
8. Gel electrophoresis of Protein.
9. Identification of Diatoms

B.Sc.	Semester: IV	Credits: 4
Course: 5	**Forensic Chemistry and Ballistics**	Hrs/Wk: 4

Learning objectives: Applications of Chemistry and Ballistics for criminal investigation. Understand the principles of several chemical methods for analysis of evidence.

Outcomes: After studying this course the students will know-

- The roles of chemistry and Ballistics in Forensic Science.
- The classification and characteristics of NDPS.
- The analysis of drugs and its importance in detecting the culprit.
- The introduction to explosives and petroleum products.
- Classification of Firearms, bullets &cartridges

UNIT I:

Forensic Chemistry: Introduction & Significance, Qualitative analysis of Precious metals –Gold, Silver & Platinum, Agrochemicals, Industrial chemicals. Chemical Etching techniques. Bribe Trapping by Phenophthalein.

Chemistry of fire – Fire triangle. Definition of Arson & Incendiary Fire. Motive of Arson – Indicators of arsons in SoC. Collection for Evidence. Chemical analysis of Arson residues & Charred debris. Relevant IPC sections – 285,435, 436 & IEA 113B.

UNIT II:

Narcotic Drugs and Psychotropic Substances- Classification- Sedatives, Stimulants, Hallucinogens, Solvents, Designer Drugs and Miscellaneous – Fentanyl, GHB, LSD. Physiological & Psychological effects of drugs. Crimes related to NDPS – Drug abuse, Illegal cultivation, Possession, Smuggling, and Clandestine laboratory operations. Role of NCB & CBN in NDPS crime control. Acts: NDPS Act 1985, Drugs and Cosmetics act – 1945 & Drug Control Act -1940.

Chemical screening of Drugs – Colour tests, Microcrystal techniques. Examination of Morphological characters in Cannabis, Cocoa, Poppy and *Ephedra* plants. Screening of Controlled substances – Phenethylamines – Methyl derivatives, Hydroxyl derivatives, Ketone derivatives, Methylene dioxy & Methoxy derivatives. Tertiary Amines & Tryptamines – Natural & Synthetic.

UNIT III:

Beverages: Classification & Composition of Alcoholic & Non-Alcoholic beverages. Collection of samples for identification of alcohols – Blood, Urine, Vitreous fluid, Brain, Liver etc. Tests and Evaluation - Blood alcohol content (BAC), Urine Alcohol Content (UAC), Breath Analysis. Clinical Features, Diagnosis and Treatment for Chronic and Acute effects of Alcohol. Relevance of Central Excise Act -1944 on Beverages. Motor Vehicles Act - 1988 (Penalties for Drunk n Drive).

UNIT IV:

Explosives - Definition of Explosives & Explosion. Combustion, Deflagration and Detonation. Classification & Composition of Explosives. Components of Military & Industrial Explosive Devices and Improvised Explosive devices. Approach to SOC – Post blast Residues Collection – Analysis of Explosives and explosive substances. Explosives act & Explosive substances act.

Adulteration of Petrol & Petroleum products & Substance. Distillation and fractionation of petroleum products and BIS. Properties & Examination of Petroleum products. Petroleum act - 1934. Essential Commodities Act - 1955

UNIT V:

Forensic Ballistics & Firearms: History, classification of firearms. Ammunition- classification, types of cartridges. Gunshot Residue-types, collection, Methods - Dry and wet, Identification tests- dermal nitrate test, Walker's test, Harrison and Gilroy's test, price's spot test. Internal and external ballistics - Range of fire-, Scorching, Blackening, Tattooing. Terminal Ballistics, Wound ballistics- entry and exit wounds. Different types of marks- firing pin marks, breech, face marks, chamber marks, extractor and ejector marks.

REFERENCE BOOKS:

1. Analytical chemistry: An Introduction – Skoog, D.A.West.D.M,Holler
2. Fuels and Combustion – Sarkar – Orient longmann1990
3. Modern Techniques of Bomb Detection and Disposal & Security– Narayanan,T.V.
4. The Analysis of Explosives, - Yinon, J. and Zitrin –Oxford
5. Kirks Fire Investigation – Dettean, J.D – Prentice Hall2002
6. Bureau of Indian standards: Specifications and Methods of Analysis for Alcoholic Beverages
7. Bureau of Indian standards: Specifications and Methods of Analysis for Petroleum Products
8. Explosive act with Amendments
9. Explosive Substances act with Amendments
10. Working Procedure Manual: Chemistry, Explosives & Narcotics, BPRd2000
11. Forensic Science in Criminal Investigation in trials – B.R.Sharma
12. Forensic Biology - Dr. (Mrs) Rukmani Krishnamurthy, SharikantH.Lade, Dr. Trupti Khedkar
13. Interdisciplinary Approach to Forensic science – Dr. Praveen Kumar Janjua, Dr. G.SunilBabu , Dr.Navjot KaurKanmai
14. Encyclopedia of Forensic Science Vol I,II & III, - Siegel.J.A , Sukoo.R.J andKnufer
15. Forensic Science in Criminal Investigation – Dr. (Mrs) Rukmani Krishnamurthy
16. Criminalistics – An Introduction to Forensic science 5th edition –Saferstein
17. Analytical chemistry: An Introduction – Skoog, D.A.West.D.M,Holle

Suggested Co-Curricular Activities:

- Seminars on explosives
- Assignments on screening of drugs
- Quiz on various 'Acts'.
- Examination of various ballistics wounds.
- Visit of Bell of Arms.

B.Sc.	Semester: IV	Credits: 1
Course: 5	**Forensic Chemistry and Ballistics Lab**	Hrs/Wk: 2

List of Experiments:

1. Analysis of alcohol as per BIS Specifications
2. Detection of Methanol, Chloral Hydrate, Diazepam & Alprazolam in Alcoholic Liquors
3. Density/ Specific gravity Determination of petroleum products by Hydrometer
4. Filter Course test for detecting adulteration of petrol
5. Phenolphthalein test for Bribe Trap cases
6. Preliminary examination of Explosives (tests for nitrite, nitrate, thiocynate, chlorate, Thiosulphate, Perchlorate, Sulphite, Phosphate etc.)
7. Identification tests-GSR
8. Demonstration of Bullets, Cartridge cases, etc.

5. BLUE PRINT OF MODEL QUESTION COURSE (Sem-End. Examinations)

MODEL QUESTION COURSE - THEORY
Semester: I
Course: ….., Title of the Course

Time: 3 Hours. Max Marks: 75

SECTION – A

Answer any 5 questions. Each question carries 5 marks **5 X 5 = 25M**
(Total 8 questions, questions 1-5 from Units 1-5 & questions 6-8 from any of the units)

1. Unit -I
2. Unit-II
3. Unit-III
4. Unit-IV
5. Unit-V
6. From any Unit
7. From any Unit
8. From any Unit

SECTION – B

Answer all the questions. Each question carries 10 marks. **5 X 10 = 50M**
(Each question (both 'A' or 'B') from each Unit.

9. A.
   or
   B
10. A.
    or
    B
11. A.
    or
    B
12. A.
    or
    B
13. A.
    or
    B

14. MODEL QUESTION COURSES FOR THEORY

MODEL QUESTION COURSE (Sem-end. Exam)

UG- DEGREE EXAMINATIONS
Semester – I
Course :Introduction to Forensic Science & Criminology

Time: 3hrs Max Marks: 75

Section – A

Answer any **FIVE** of the following. **5X5=25M**

1. What is CFPB & CDFD?
2. Write about Cr.P.C.
3. Write about CCMB & LaCONES.
4. Write about POSCO act.
5. Write about TLC
6. Define Criminology & Penology
7. What is Mc. Naughten Rule
8. What is Freuds psychoanalytical theory.

Section – B

Answer **FIVE** questions. **5X10=50M**

9. (a) Explain organization of FSL in India.
   (OR)
   (b) Explain role of CID & IB in crime investigation.

10. (a) Explain Fundamental Rights & Duties.
    (OR)
    (b) Explain role of LokAyukta & LokAdalat in justice system of India

11. (a) Explain working principle and instrumentation of HPLC.
    (OR)
    (b) Explain difference between AAS & AES.

12. (a) Explain socio-economic causatives of crime.
    (OR)
    (b) Classify crimes and give IPC sections to all.

13. (a) Explain various personality disorders.
    (OR)
    (b) Explain principle and procedure of Polygraphy.

MODEL QUESTION COURSE (Sem-end. Exam)

UG - DEGREE EXAMINATIONS
Semester – II
Course :Crime Scene Management

Time: 3hrs Max Marks: 75

Section – A

Answer any **FIVE** of the following. **5X5=25M**

1. Define Crime Scene?
2. Write about Golden Rules of Crime Scene Safety.
3. Write about Micro Photography.
4. Write about EMR photographic techniques.
5. Define Physical Evidence
6. Write about digital evidence.
7. What is Chain of Custody
8. What is Crime Scene Reconstruction.

Section – B

Answer **FIVE** questions. **5X10=50M**

9. (a) Explain Processing of Crime Scene.
(OR)
(b) Explain role of Search Methods in crime scene investigation.

10. (a) Explain Crime Scene Sketching.
(OR)
(b) Explain methods of crime scene photography.

11. (a) Explain Collection, Preservation and Packing of various biological evidence.
(OR)
(b) Explain Collection, Preservation and Packing of various digital evidence.

12. (a) Explain importance of packing material in evidence packing.
(OR)
(b) Explain documentation required in evidence packing & forwarding.

13. (a) Explain Blood pattern analysis in crime scene reconstruction.
(OR)
(b) Explain gait pattern analysis.

MODEL QUESTION COURSE (Sem-end. Exam)
UG - DEGREE EXMINATIONS
Semester – III
Course: Questioned Documents and Finger Impressions

Time: 3hrs Max Marks: 75

Section – A

Answer any **FIVE** of the following. **5X5=25M**

1. Define Document.
2. Classify various documents.
3. Write about Handwriting characteristics.
4. Write about Standards.
5. Write about alterations
6. Define Poroscopy & Edgeoscopy
7. What are secret writings
8. What is Papillary ridge.

Section – B

Answer **FIVE** questions. **5X10=50M**

9. (a) Explain contributions of AS Osborn.
   (OR)
   (b) Explain General & Individual characteristics of handwriting.

10. (a) Explain Types of forgeries.
    (OR)
    (b) Explain Instrumentation and Principles of Electrostatic Detection Apparatus

11. (a) Explain working principle of VSC.
    (OR)
    (b) Explain Types of Fingerprints.

12. (a) Explain Development of Latent Fingerprints by various methods.
    (OR)
    (b) Explain henrys classification of fingerprints.

13. (a) Explain Recording & lifting of Fingerprints from Cadavers.
    (OR)
    (b) Explain process of AFIS.

MODEL QUESTION COURSE (Sem-end. Exam)

UG - DEGREE EXAMINATIONS
Semester – IV
Course: Forensic Biology & DNA Fingerprinting

Time: 3hrs Max Marks: 75

Section – A

Answer any **FIVE** of the following. **5X5=25M**

1. What is cell theory?
2. Draw structure of prokaryotic cell.
3. Define Immunity.
4. Write about nature of blood.
5. Write about diatoms
6. Define Smuggling & Poaching.
7. Draw structure of DNA with all components
8. What is VNTR & STR.

Section – B

Answer **FIVE** questions. **5X10=50M**

9. (a) Explain types of antigens.
   (OR)
   (b) Explain types of immunity.

10. (a) Explain difference between animal and human hair.
    (OR)
    (b) Explain composition of blood & Blood groups.

11. (a) Write about role of various organizations involved in Wildlife Protection & Conservation.
    (OR)
    (b) Explain Life cycle of insect.

12. (a) Explain Composition and Structure of DNA & RNA.
    (OR)
    (b) Explain r-DNA technology.

13. (a) Explain DNA Separation techniques.
    (OR)
    (b) Explain principle and procedure of DNA Amplification.

MODEL QUESTION COURSE (Sem-end. Exam)

UG - DEGREE EXAMINATIONS
Semester – IV
Course: Forensic Chemistry and Ballistics

Time: 3hrs Max Marks: 75

Section – A

Answer any **FIVE** of the following. **5X5=25M**

1. What are precious metals?
2. Write about Chemical Etching techniques
3. Write about Fire triangle.
4. Write about NDPS act.
5. Write about BIS & Petroleum act
6. Define Explosives & Explosion
7. What is Deflagration and Detonation
8. What is Range of fire.

Section – B

Answer **FIVE** questions. **5X10=50M**

9. (a) Explain Indicators of arsons in SoC.
(OR)
(b) Classify & Explain NDPS.

10. (a) Explain Physiological & Psychological effects of drugs.
(OR)
(b) Explain role of NCB & CBN in NDPS crime control

11. (a) Explain Blood alcohol content (BAC).
(OR)
(b) Explain difference between BAC & UAC.

12. (a) Explain Classification & Composition of Explosives.
(OR)
(b) Explain Distillation and fractionation of petroleum products.

13. (a) Classify Firearms & Ammunition with explanation.
(OR)
(b) Explain ballistics of entry & exit wounds.