

Sant Gadge Baba Amravati University, Amravati



THREE /FOUR YEAR DEGREE OF BACHELOR OF SCIENCE

Bachelor of Science

SUBJECT: FORENSIC SCIENCE

FACULTY: SCIENCE AND TECHNOLOGY

**(Courses effective from Academic Year 2026-2027)
Under Uniform NEP 2020**

SYLLABUS

**Semester I and II
Semester III and IV
Semester V and VI**

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Preamble:

The syllabus of Forensic Science for the First year has been redesigned as per National Education Policy 2020 under Choice based Credit System (CBCS) to be implemented from 2024-2025. In CBCS pattern semester system has been adopted for FY, SY and TY which includes Discipline Specific Core Course (DSC) at F. Y. level, Ability Enhancement Compulsory Course (AEC), Discipline Specific Elective Course (DSE) and Open Elective Course (OE), Skill Enhancement Course (SEC), Indian Knowledge Science (IKS), Vocational Skill course (VSC) etc.

It imbibes the guidelines verbalized by the UGC, UGC LOCF, NEP-2020 and Government of Maharashtra for all its Under Graduate programmes. The Board of Study in Chemistry of the SGB Amravati University prepared the syllabus for the first year of undergraduate programme in Forensic Science. The new curriculum of B. Sc. (Forensic Science) offer courses in the areas of, Forensic Chemistry, Forensic Toxicology, Forensic Physics, Criminology, Forensic Biology, Forensic Serology, Forensic Psychology, Digital and Cyber Forensic, etc. All the courses are having defined objectives and learning outcomes, which will help prospective students in choosing the elective courses to broaden their skills in the field of forensic science and interdisciplinary areas. The courses will train students with sound theoretical and experimental knowledge that suits the need of academia and industry. The courses also offer ample skills to pursue research as career in the field of forensic science and allied areas.

Programme Attributes of a Forensic Science Graduate

Attributes of forensic science graduate under the outcome-based teaching-learning framework may encompass the following:

- **Core competency:** The forensic science graduates are expected to know the basic concepts of forensic science and applied areas of forensic science. These fundamental concepts would reflect the latest understanding of the field, and therefore, are dynamic in nature and require frequent, regular and time-bound revisions.
- **Communication skills:** Forensic Science graduates are expected to possess minimum standards of communication skills expected of a science graduate in the country. They are expected to read and understand documents with in-depth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea/finding/concepts to wider audience.
- **Critical thinking:** Forensic Science graduates are expected to know basics of cognitive biases, mental models, scientific methodology and sophisticated techniques.
- **Psychological skills:** Graduates are expected to possess basic psychological skills required to face the world at large, as well as the skills to deal with individuals and students of various sociocultural, economic and educational levels. Psychological skills may include feedback loops, self-compassion, self-reflection, goal-setting, interpersonal relationships, and emotional management. They are also expected to deal with unsound mind people in sensible manner.
- **Problem-solving:** Graduates are expected to be equipped with problem-solving philosophical approaches that are pertinent across the disciplines.
- **Analytical reasoning:** Graduates are expected to acquire formulate cogent arguments and spot logical flaws, inconsistencies, circular reasoning etc.

- **Research-skills:** They are expected to be keenly observant about what is going on in the natural surroundings to awake their curiosity. Graduates are expected to design a scientific experiment through statistical hypothesis testing and other *a priori* reasoning including logical deduction.
- **Teamwork:** Graduates are expected to be team players, with productive cooperations involving members from diverse socio-cultural backgrounds.
- **Digital Literacy:** Graduates are expected to be digitally literate for them to enroll and increase their core competency via e-learning resources such as MOOC and other digital tools for lifelong learning. Graduates should be able to spot data fabrication and fake news by applying rational skepticism and analytical reasoning.
- **Moral and ethical awareness:** Graduates are expected to be responsible citizen of India and be aware of moral and ethical baseline of the country and the world. They are expected to define their core ethical virtues good enough to distinguish what construes as illegal and crime in Indian constitution. Emphasis be given on academic and research ethics, including fair Benefit Sharing, Plagiarism, Scientific Misconduct and so on.
- **Leadership readiness:** Graduates are expected to be familiar with decision making process and basic managerial skills to become a better leader. Skills may include defining objective vision and mission, how to become charismatic inspiring leader and so on.

Qualification Descriptors

The qualification descriptors for a Bachelor's degree in Forensic Science may include following:

- i. Systematic and fundamental understanding of forensic science as a discipline.
- ii. Skill and related developments for acquiring specialization in the subject.
- iii. Identifying forensic science related problems, analysis and application of data using appropriate methodologies and concepts.
- iv. Applying subject knowledge and skill to solve complex problems with defined solutions.
- v. Finding opportunity to apply subject-related skill for acquiring jobs and self-employment.
- vi. Understanding new frontiers of knowledge in forensic science for professional development.
- vii. Applying subject knowledge for solving societal problems related to application of forensic science in day-to-day life.
- viii. Applying subject knowledge for preventive measures amongst the society.
- ix. Applying subject knowledge for new research and technology.

(Source: Learning Outcomes based Curriculum Framework (LOCF) for (B.Sc. with Forensic Science) Undergraduate Programme 2020 https://www.ugc.gov.in/pdfnews/8218435_B.Sc-Hons-Forensic-Science.pdf)

Program Outcomes for BSc

POs:

At the time of graduation, Students would be able to

PO1.Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2.Effective Communication: Speak, read, write, and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.

PO3. Social Interaction: Elicit views of others, mediate disagreements, and help reach conclusions in group settings.

PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological change.

Program Specific Outcomes for BSc (Forensic Science)

PSOs:

Upon completion of the programme successfully, the learners would be able to-

1. Understand the crime and crime scene management procedure.
2. Describe the various instrumental techniques (Analytical Techniques)
3. Understand the evidence collection and analysis of physical evidence and digital evidence.
4. Analyzed the personality of the person. Assessment of criminal tendency of the person.
5. Understand the legal aspect of crime and criminal activities by studying IPC, CrPC, IEA, etc.
6. Analysis of physical evidence such as soil, paint, dust, glass, etc.

Employability Potential of the Programme:

Forensic Science is recognition, identification, analysis and reporting of physical as well as digital evidence by using various scientific methods and/or techniques for the purpose of justice of administration. In simple word, it is the science which help in solving criminal investigation. From the ancient time crime is non removable part of our society. Every day, every minutes and in every second criminal activity has been taking place and with increase in frequency of crime there is proper procedure for solving crime which is developed by forensic science. Today, in each and every field crime has been taking place such as murder, robbery, rape, cyber-crime, kidnapping,

money laundering, etc. Forensic Science has many branches such as Forensic Physics which deals with the glass analysis, soil analysis, etc. Forensic Ballistics includes study of firearms, bullets and cartridges. Forensic Biology includes study of bones, skeleton system, plant material, animal body part, and DNA analysis. Forensic Chemistry and Toxicology includes study of harmful chemicals and Poisons. Forensic Psychology includes study of human behavior. Digital Forensic includes crime related to digital devices such as computer, mobile, internet, etc.

With increase in modernization in today's society, scope of crime also increases. To handle and solve the crime we need specialist peoples and study of forensic science build a very strong manpower for dealing this situation. When a student study forensic science then he/she can do work in following sectors.

- Investigation Agency
- Pharmaceutical Industry
- Chemical Firms
- Biological Firms
- Research Centers
- Public Relations
- Academic Institutions
- Journalism
- Judicial System

Future scope for Forensic Science graduates:

- Students can do Ph.D. at National Forensic University (NFSU) IITs, NITs, IISERs, IISc, BARC, TIFR, CSIR, Universities, Colleges by clearing NET-JRF, GATE or PET examinations.
- Students can do Ph.D. from foreign Universities, students may get scholarships.
- Students can take teaching jobs at Universities or Sr. colleges by clearing SET or NET-LS examinations.
- Research Scientists in various Public Sector Units like ONGC, IOCL, NTPC and Private sector industries.
- Students can become security analyst, penetration tester, software developers in IT industries.
- Students can become Quality Control Chemists/ Food Inspector at Food Co-operation of India, Food Safety and Standards etc.
- Student can become Investigator, Forensic Scientist.

- Laboratory technicians to look after sophisticated instruments like NMR, Mass Spectrometer, UV-Visible Spectrophotometer, Single crystal machines, XRD, SEM, AAS, TEM etc.
- Technician for repairing sophisticated instruments
- Student can become medico legal officer
- Research Scientist/ Operations Manager/ Chemists / Quality Manager / Research Manager at various industries like Pharmaceuticals, Cement, Plastic, Drugs, Paint, Dyes, Agricultural sector etc.
- Student can become small or medium scale entrepreneur (own industry) for investigation purpose and for preventive forensic.
- Students can become Government officers by clearing UPSC, MPSC, Bank Probationary officers, other competitive examinations
- Employee at Security Printing and Minting co-operation of India
- Employee at Office in Indian Army, Navy and Air force.
- Forensic Science graduate work for police system and also work as an investigator.
- Forensic Science graduates also work in central investigative agency like CBI, IB, NIA and for other force like BSF, NSG, BPRD, NCRB.
- Forensic Science graduate also work in journalism.
- Forensic science graduates work in judicial process.
- Free-lancer as educational you tube videos maker
- Educational-aid maker

Government jobs:

There are a variety of career prospects waiting to be tapped at the government level.

Because there is also a wide scope of research. Some of the government positions that can be considered are-

- Senior Research Associate
- Laboratory Technologist
- Research Analyst
- Research Officer
- Warehouse Supervisor
- Scientist
- Assistant Professor
- Development Supervisor
- Quality Management Analyst
- Software Developer
- Investigator

Scope for further studies:

- If the candidates do not wish to pursue job opportunities after M.Sc. Forensic Science, they can opt for higher education to polish their skills and gain a higher level of experience. They can go on to pursue PhD at premier institutes in India and abroad. They can appear for various competitive exams like NET/ GATE (in India) and JRE/ TOEFEL (Abroad) and avail fellowship for PhD. A significant amount of fellowship is available for pursuing PhD.
- Candidates can acquire education in management and then can join industry or can start their own business or industry.
- Opportunities to the students who are interested in opting for a challenging career in the field, leading to the award of B.Sc. Forensic.
- Which on completion will be professionals to police agencies, doctors, detectives, lawyers, judges and often provide expert testimony during trials in the Hon'ble Courts?
- The courses are aimed at creating informed citizenry as well as a workforce that would be able to stand up to the ever rising stature of crime and criminals in the society.
- Our comprehensive syllabi, practical oriented & skill based teaching-learning (would) enable(s) our students to be useful and ready (for) to the investigation agencies (Police, CID, CBI, etc.); to the Forensic Science Laboratories (District, Regional, State & Mobile units); to colleges &/or institutions (as qualified teachers for the subject i.e. Forensic Science); various laboratories (undertaking quality control, quality assurance, analytical

work, research, etc.); as forensic experts (to give ‘expert witness’ as an aid to the court & lawyers as amicus curiae, etc.) to name a few!

- In addition to this the students will develop the qualities such as logical and critical thinking of the problems.
- The participation of students in various extracurricular and extension activities will lead to develop the multifaceted personality which will be observed in his effective communication and social interactions.
- The students will also have developed qualities such as ethical behavior, integrity, self- learner etc. In summary this will help him in his life to become a good citizen and will be asset to the country.

Credit Distribution

Three/Four-year UG Degree Programme (Level 4.5 to 5.5)

Vertical	Vertical Type	I	II		III	IV	V	VI	Total Credits	Grand Total
	(i) Three-year UG Degree Programme (Level 4.5.to 5.5)									
A	Major DSC (60–64) (Minimum 50% of Total Credits)	4	4	Major	6	8	8	8	38	48
				IKS	2				2	
		0	0	Elective	0	0	4	4	8	
B	Minor (from same faculty of DSC) (18–24)	4	4		4	4	4	4	24	24
C	Generic/Open Elective (OE) (Faculty-wise basket other than Major/Minor faculty) (10–12)	4	4		2	2	0	0	12	12
D(i)	Vocational Skill Courses (VSEC) corresponding to Major/Minor (8–10)	0	2		2	2	2	2	10	16
D(ii)	Skill Enhancement Courses (SEC)	2	2		0	0	2	0	6	
E(i)	Ability Enhancement Courses (AEC) (English + Modern Indian Language)	1+1	1+1		1+1	1+1	0	0	8	14
E(ii)	Indian Knowledge System (IKS) 2 Generic	2	0		0	0	0	0	2	
E(iii)	Value Education Courses (VEC) (Understanding India, EVS, Digital & Technological Solution) 4	2	2		0	0	0	0	4	
F(i)	Internship / Apprenticeship corresponding to Major 8 (OJT)	0	0		0	0	0	4	4	18
F(ii)	Field Projects / Community Engagement & Service (CEP) corresponding to Major 4-6	0	0		2	2	2	0	6	
F(iii)	Co-curricular Courses (CC) (health & wellness, yoga education, sports, fitness, cultural activities, NSS/ NCC & Fine/ Applied/ Visual/ Performing Arts) 8	2	2		2	2	0	0	8	
	Total Credits per Semester	22	22		22	22	22	22	132	132

(ii) Four-year UG Degree programme (Level 6.0) Honors Degree in Major or Minor					
A. Honors Degree in Major or Minor					
	Vertical Type		Semester VII	Semester VIII	
	Major (Offered at Three-year UG Programme)	Mandatory	12-14(2*4+2*2 or 3*4+2)	12-14(2*4+2*2 or 3*4+2)	28
		Elective	4	4	8
	Research Methodology (RM)		4	0	8
	On the Job Training (OJT)		0	4	4
	Total		22	22	44
	Cumulative		(132+44) 176		
(ii) Four-year UG Degree Programme (Level 6.0)					
B. Honors with Research Degree in Major or Minor					
	Major (Offered at Three-year UG Programme)		Semester VII	Semester VIII	
		Mandatory	8-10 (24+2 or 24)	8-10 (24+2 or 24)	20
		Elective	4	4	8
	Research Methodology (RM)		4	0	4
	Research Project (RP)		4	8	12
	Total		22	22	44
	Cumulative		(132+44) 176		

Sant Gadge Baba Amravati University, Amravati

Teaching and Learning Scheme: for the Degree of Bachelor of Science

FACULTY: SCIENCE AND TECHNOLOGY

TLE Scheme for FIRST YEAR: SEMESTER – I (Forensic Science) (Level 4.5)

(As per uniform NEP Scheme)

The Vertical	Type of Course	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract (Total)	
						External		Internal		Max. Marks	Min. Marks
						Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major / Minor	Theory	117200	Basics of Forensic Science-1	2	2	30	9	20	6	50	20
	Lab/Practical	117201	Basic of Forensic Science Lab 1	2	4	25	10	25	10	50	20
Minor / Major	Theory	-	-	2	2	30	9	20	6	50	20
	Lab/Practical	-	-	2	4	25	10	25	10	50	20
Generic/Open Elective	Theory	117202	Criminology- I	2	2	30	9	20	6	50	20
	Theory	117203	Applied Forensic Science	2	2	30	9	20	6	50	20
VSC	-	-	-	-	-	-	-	50	20	50	20
SEC	Lab/Practical	117204	Forensic Science Lab 2 (Advanced Forensic Science)	2	4	-	-	50	20	50	20
AEC - English	Theory		Refer University basket	1	1						
AEC –MIL	Theory		Refer University basket	1	1						
IKS-Generic	Theory		Refer University basket	2	2						
VEC	Theory		Refer University basket	2	2						
CC	Outdoor		Separate SOP will be released	2	4						
TOTAL				22	30						

TLE Scheme for FIRST YEAR: SEMESTER – II (Level 4.5)

The Vertical	Type of the Course	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract (Total)	
						External		Internal		Max. Marks	Min. Marks
						Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major / Minor	Theory	117205	Basics of Forensic Chemistry and Toxicology -2	2	2	30	9	20	6	50	20
	Lab/Practical	117206	Basics of Forensic Chemistry and Toxicology- Lab 3	2	4	30	9	20	6	50	20
Major / Minor	Theory		-	2	2	25	10	25	10	50	20
	Lab/Practical		-	2	4	30	9	20	6	50	20
Generic/ Open Elective	Theory	117207	Applied Forensic Chemistry and Toxicology	2	2	25	10	25	10	50	20
	Theory	117208	Criminology- II	2	2	30	9	20	6	50	20
VSC	Lab/Practical	117209	Applied Forensic Science Lab 4	2	4	-	-	50	20	50	20
SEC	Lab/Practical	117210	Applied Forensic Chemistry and Toxicology Practical Lab 5	2	4	-	-	50	20	50	20
AEC - English			Refer University basket	1	1	-	-	50	20	50	20
AEC –MIL			Refer University basket	1	1	-	-	50	20	50	20
VEC			Refer University basket	2	2						
CC			Separate SOP will be released	2	4						
TOTAL				22	32						

*** Important:**

- VSC Should be Complementary to Major/Minor
- SEC has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor

TLE Scheme for SECOND YEAR: SEMESTER – III (Level 5.0)

Subject	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract (Total)	
						External		Internal			
						Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Forensic Science	Major-T	117211	Forensic Physics	2	2	30	9	20	6	50	20
Forensic Science	Major-T	117212	Forensic Ballistics	2	2	30	9	20	6	50	20
Forensic Science	IKS-T	117213	IKS in Forensic Science	2	2	30	9	20	6	50	20
Forensic Science	Major-P	117214	Forensic Physics Lab 6	2	4	25	10	25	10	50	20
Forensic Science	Minor-T	117215	Minor Forensic Physics and Ballistics	2	2	30	9	20	6	50	20
Forensic Science	Minor-P	117216	Minor Forensic Physics Lab 7	2	4	25	10	25	10	50	20
Forensic Science	GOEC-T	117217	Forensic Science for competitive Exam	2	2	30	9	20	6	50	20
Forensic Science	VSC-P	117218	Forensic Science Lab 8	2	4	-	-	50	20	50	20
Forensic Science	FP/CES	117219	Forensic Science Lab 9 (FP/ CEP in Forensic Science - I)	2	4	-	-	50	20	50	20
Forensic Science	CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Important: * VSC Should be Complementary to Major

** SEC has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor

TLE Scheme for SECOND YEAR: SEMESTER – IV (Level 5.0)

Subject	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract	
						External		Internal		(Total)	
						Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Forensic Science	Major-T	117220	Forensic Biology-1	2	2	30	9	20	6	50	20
Forensic Science	Major-T	117221	Forensic Biology-2	2	2	30	9	20	6	50	20
Forensic Science	Major-T*	117229*	Techniques in Forensic Biology- 3	2	2	30	9	20	6	50	20
Forensic Science	Major-P	117222	Forensic Biology Lab 10	2	4	25	10	25	10	50	20
Forensic Science	Minor-T	117223	Forensic Biology	2	2	30	9	20	6	50	20
Forensic Science	Minor-P	117224	Minor Forensic Biology Lab 11	2	4	25	10	25	10	50	20
Forensic Science	GOEC-T	117225	Advanced Techniques in Forensic Science	2	2	30	9	20	6	50	20
Forensic Science	VSC-P	117226	Hands on Techniques in Advanced Forensic Biology Lab 12	2	4	-	-	50	20	50	20
Forensic Science	SEC-P#	117227 [#]	Forensic Biology Lab 13	2	4	-	-	50	20	50	20
Forensic Science	FP/CES	117228	Forensic Science Lab 14 (FP/ CEP in Forensic Science - II)	2	4	-	-	50	20	50	20
Forensic Science	CC		Separate SOP shall be consulted from University website	2	4	-	-	50	20	50	20

*** To be implemented w.e.f. academic session 2026-27** **# - Only applicable up to academic session 2025-26**

Important: VSC Should be Complementary to Major and SEC has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor

TLE Scheme for THIRD YEAR: SEMESTER – V (Level 5.5)

Level	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical Marks				Theory/Pract (Total) Marks	
						External		Internal			
						Max.	Min.	Max.	Min.	Max.	Min.
5.5	Major-T	117230	Forensic Psychology	2	2	30	9	20	6	50	20
5.5	Major-T	117231	Forensic Medicine	2	2	30	9	20	6	50	20
5.5	Major-T	117232	Environmental & Wildlife Forensics	2	2	30	9	20	6	50	20
5.5	Major-P	117233	Forensic Psychology Lab 15	2	4	25	10	25	10	50	20
5.5	Major-Elective T1	117234	Disaster Victim Identification and Imaging Techniques	2	2	30	9	20	6	50	20
5.5	Major-Elective P1	117235	DVIIT Practical Lab 16 A	2	4	25	10	25	10	50	20
OR											
5.5	Major-Elective T2	117236	Criminal Profiling and Behavioral Analysis	2	2	30	9	20	6	50	20
5.5	Major-Elective P2	117237	Criminal Profiling and Behavioral Analysis Lab 16 B	2	4	25	10	25	10	50	20
5.5	Minor-T	117238	Forensic Psychology-3	2	2	30	9	20	6	50	20
5.5	Minor-P	117239	Forensic Psychology Lab 17	2	4	25	10	25	10	50	20
5.5	VSC-P	117240	Forensic Instrumentation Lab -18	2	4	-	-	50	20	50	20
5.5	SEC-P	117241	Forensic Photography Lab 19	2	4	-	-	50	20	50	20
5.5	FP/CEP	117242	(FP/CEP in Forensic Science - III) Forensic Science Lab 20	2	4	-	-	50	20	50	20
5.5	Non Credit		Foundation of Artificial Intelligence	NC	2			30+20	9+6	50	20

Important:

- **VSC Should be Complementary to Major**
- **SEC must be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor**
- As per Sant Gadge Baba Amravati University, Amravati Extra-Ordinary Notification No. No. 241/2025 Dated 24/12/2025 “Foundation of Artificial Intelligence” is the mandatory **Non Credit Course** compulsory course for all the UG students in fifth semester of all undergraduate programs of all faculties in Sant Gadge Baba Amravati University, Amravati to earn their degree
- NC is Non Credit Course
- Students must select **Any One** of the Major-Elective Courses (T1 to T2) with respective Practical Course in Semester V.

TLE Scheme for THIRD YEAR: SEMESTER – VI (Level 5.5)

Level	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical Marks				Theory/Pract (Total) Marks	
						External		Internal			
						Max.	Min.	Max.	Min.	Max.	Min.
5.5	Major-T	117243	Basics of ICT	2	2	30	9	20	6	50	20
5.5	Major-T	117244	Digital and Cyber Forensics	2	2	30	9	20	6	50	20
5.5	Major-T	117245	Fundamentals of Forensic ICT	2	2	30	9	20	6	50	20
5.5	Major-P	117246	Cyber and ICT Forensics Lab 21	2	4	25	10	25	10	50	20
5.5	Major-Elective T1	117247	Forensic Accounting and Auditing	2	2	30	9	20	6	50	20
5.5	Major-Elective P1	117248	Forensic Accounting Lab 22 A	2	4	25	10	25	10	50	20
OR											
5.5	Major-Elective T2	117249	Forensic Fraud Investigation	2	2	30	9	20	6	50	20
5.5	Major-Elective P2	117250	FRS Lab 22 B	2	4	25	10	25	10	50	20
5.5	Minor-T	117251	Digital and Cyber Forensics	2	2	30	9	20	6	50	20
5.5	Minor-P	117252	Digital and Cyber Forensics Lab 23	2	4	25	10	25	10	50	20
5.5	VSC-P	117253	FRS Lab 24	2	4	-	-	50	20	50	20
5.5	Intern/Apprenticeship	117254	FRS Lab 25 Internship /Apprenticeship/ OJT	4	8	-	-	50	20	50	20

Important:

- VSC Should be Complementary to Major has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor
- **Students** must select **Any One** of the Major-Elective Courses (T1 to T2) with respective Practical Course in Semester VI.

Examination and Assessment Process:

- i. The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- ii. Exit options are provided with Certificate, Diploma and Basic Bachelor’s degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor’s degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- iii. For the smooth success of four-year degree programme with multiple entry and exit systems, the examination mode should be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit) examination modes in line with the UGC Report on ‘Evaluation Reforms in Higher Educational Institutions (2019).

Examination, Evaluation and Assessment Scheme

The total marks for each Course shall be based on Continuous Assessment and Semester End Examination. Each theory course of Major, Minor, GE/OE, AEC, IKS, VEC as mentioned in **Teaching Learning Scheme** prepared by the Board of Studies shall be evaluated as per the scheme as mentioned in the following table

Examination, Evaluation and Assessment Scheme

Vertical I No.	The Vertical	Mode of Examination , Evaluation & Assessment	Theory				Theory (Total)		Practical				Practical (Total)	
			External		Internal				External		Internal			
			Max. Marks	Min Mar ks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
A	Major	External & Internal	30/ 60	9/ 18	20/ 40	6/ 12	50/ 100	20/ 40	25/ 50	10/ 20	25/ 50	10/ 20	25/ 50	10/ 20
B	Minor		30/ 60	9/ 18	20/ 40	6/ 12	50/ 100	20/ 40	25/ 50	10/ 20	25/ 50	10/ 20	25/ 50	10/ 20
C	Generic/ Open Elective	Internal			50	20	50	20	--	--	50	20	50	20
D	VSC	Internal			50	20	50	20			50	20	50	20
	SEC	Internal	--	--	50	20	50	20			50	20	50	20
e	AEC (Eng. & One MIL Composite)	Internal			50	20	50	20						
	IKS (Generic)	Internal			50	20	50	20						
	VEC	Internal			50	20	50	20						
F	Internship/ Apprenticeshi p	Internal	Assessment of these verticals shall be based on various activities/practices. The evaluation/assessment shall be done by appointing external examiner by principal from Industry/Organisation/Academia. The mentor faculty shall be the internal examiner. It shall be evaluated by giving maximum 50 marks per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process shall be prescribed separately.											
	FP/CEP													
	CC													

Continuous Assessment Tests (CAT)

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under-

- i. Three CAT each of 8 / 10 Marks (Theory) as applicable and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days.

- ii. Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- iii. Total Performance in CAT (i.e.40 %) shall be based on the **best two out of three** in CAT examinations
- iv. Internal assessment (CAT) shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, record book, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

Conduction of the Examination:

As per the scheme of teaching, learning, examination and evaluation, theory/practical examinations of Semester-I, II, III, IV, V, VI, VII and VIII shall be conducted by the University (except for Internal Examinations as applicable) at the end of each semester.

The theory/practical examinations of all the Semesters shall be held as per the following Schedule

Sr.No.	Name of the Examination	End Sem Examination	Supplementary Examination*
1	Semester-I, III, V and VII	Winter	Summer
2	Semester-II, IV, VI and VIII	Summer	Winter

*The University may evolve mechanism for conducting repeat end semester examination.

Such repeat examinations shall have to be conducted within one month of the regular even semester examination and on demand examination.

1. The practical examination of all semesters shall be conducted by the University at the end of each semester. The HEI shall conduct the Practical examination of odd semesters as per the schedule announced by the University. **However, the appointment of the External and Internal Examiners shall be done by the Head or Principal of respective HEI to conduct external examination of the odd semester and the same should be communicated to the University before commencement of the practical examination.** The University shall conduct the external practical examination of all even semester by appointing external and internal examiners.
2. The examinations specified above shall be held twice in a year at such places and on such dates as may be prescribed by the University.
3. An applicant to an examination specified above, shall pursue a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College/Institute/University department.
4. Provided that the student shall be eligible to appear for examination if -
 - a. He/she complies with the provisions of the Ordinance pertaining to the Examination in general from time to time.
 - b. He/she has prosecuted a regular course of study in a university department/college affiliated to the University.
 - c. He/she has in the opinion of the Principal shown satisfactory progress in his/her studies.
5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be *mutatis-mutandis* applicable to every collegiate/non-collegiate student.
6. The fees for each theory examination and practical examination conducted by the university shall be as prescribed by the University, from time to time

Sant Gadge Baba Amravati University, Amravati



Degree of Bachelor of Science

Forensic Science

Semester I and II

FACULTY: SCIENCE AND TECHNOLOGY

**(Courses effective from Academic Year 2026-27)
Under NEP 2020 (As per Uniform NEP Scheme)**

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Sant Gadge Baba Amravati University, Amravati

Teaching and Learning Scheme: for the Degree of Bachelor of Science

FACULTY: SCIENCE AND TECHNOLOGY

TLE Scheme for FIRST YEAR: SEMESTER – I (Forensic Science) (Level 4.5)

(As per uniform NEP Scheme)

The Vertical	Type of Course	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract	
						External		Internal		(Total)	
						Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major / Minor	Theory	117200	Basics of Forensic Science-1	2	2	30	9	20	6	50	20
	Lab/Practical	117201	Basic of Forensic Science Lab 1	2	4	25	10	25	10	50	20
Minor / Major	Theory	-	-	2	2	30	9	20	6	50	20
	Lab/Practical	-	-	2	4	25	10	25	10	50	20
Generic/Open Elective	Theory	117202	Criminology- I	2	2	30	9	20	6	50	20
	Theory	117203	Applied Forensic Science	2	2	30	9	20	6	50	20
VSC	-	-	-	-	-	-	-	50	20	50	20
SEC	Lab/Practical	117204	Forensic Science Lab 2 (Advanced Forensic Science)	2	4	-	-	50	20	50	20
AEC - English	Theory		Refer University basket	1	1						
AEC –MIL	Theory		Refer University basket	1	1						
IKS-Generic	Theory		Refer University basket	2	2						
VEC	Theory		Refer University basket	2	2						
CC	Outdoor		Separate SOP will be released	2	4						
TOTAL				22	30						

TLE Scheme for FIRST YEAR: SEMESTER – II (Level 4.5)

The Vertical	Type of the Course	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract (Total)	
						External		Internal		Max. Marks	Min. Marks
						Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major / Minor	Theory	117205	Basics of Forensic Chemistry and Toxicology -2	2	2	30	9	20	6	50	20
	Lab/Practical	117206	Basics of Forensic Chemistry and Toxicology- Lab 3	2	4	30	9	20	6	50	20
Major / Minor	Theory		-	2	2	25	10	25	10	50	20
	Lab/Practical		-	2	4	30	9	20	6	50	20
Generic/ Open Elective	Theory	117207	Applied Forensic Chemistry and Toxicology	2	2	25	10	25	10	50	20
	Theory	117208	Criminology- II	2	2	30	9	20	6	50	20
VSC	Lab/Practical	117209	Applied Forensic Science Lab 4	2	4	-	-	50	20	50	20
SEC	Lab/Practical	117210	Applied Forensic Chemistry and Toxicology Practical Lab 5	2	4	-	-	50	20	50	20
AEC - English			Refer University basket	1	1	-	-	50	20	50	20
AEC –MIL			Refer University basket	1	1	-	-	50	20	50	20
VEC			Refer University basket	2	2						
CC			Separate SOP will be released	2	4						
TOTAL				22	32						

*** Important:**

- VSC Should be Complementary to Major/Minor
- SEC has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor

Examination and Assessment Process:

- The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- Exit options are provided with Certificate, Diploma and Basic Bachelor's degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor's degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
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			Max. Marks	Min. Marks	Max. Marks	Min. Marks			Max. Marks	Min. Marks	Max. Marks	Min. Marks		
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5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be *mutatis-mutandis* applicable to every collegiate/non-collegiate student.

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Course Category: Major / Minor (Theory)-1

117200 Basics of Forensic Science

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117200	Basics of Forensic Science	2	30	2 Hrs	30+20 = 50

Course Objective:	After studying this paper, the students will know – 1. The basic principles on which the science of fingerprinting is based. 2. Fingerprints are the most infallible means of identification. 3. The world's first fingerprint bureau was established in India. 4. The working of the forensic establishments in India and abroad. 5. The importance of detecting frauds and forgeries by analyzing questioned documents. 6. The importance of examining questioned documents in crime cases. 7. The significance of comparing hand writing samples.					
Course Outcomes:	Students will be able to – 1. Understand the development, history, growth and scope of forensic science. 2. Understand the establishments of FSL and significance of blood stain spatter analysis. 3. Analyze the crime and crime scene management procedure. 4. Analyze the different methods of prints and impressions. 5. Determine the significance of document analysis in forensic science. 6. Explain the medico-legal importance of various crimes.					
Unit System	Contents	Work load Allotted	Weight age of Marks Allotted	Incorporation of Pedagogies		
Unit I	<i>Introduction to Forensic Science</i> A) Definition, Historical aspects (Indian & World), Principles, Needs & Functions of Forensic Science. B) Branches of Forensic Science. Divisions in Forensic Science Laboratories	8 Hrs	8 Marks	1. Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. 3. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance		
Unit II	<i>Taxonomy of Crime Scene Investigation</i> A) Crime scene and its types. Classification of Crime Scene Evidence. Frye case and Daubert standard. B) Duties of Forensic Scientist, Code of Conduct, Qualifications. Legal Considerations (ethics) at Crime Scene	7 Hrs	7 Marks			

Unit III	<i>Basics of Fingerprint</i> A) Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Latent prints. Constituents of sweat residue	8 Hrs	8 Marks	proper practical understanding. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions and problem-solving. 6. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science.
Unit IV	<i>Questioned Documents</i> A) Definition of questioned documents. Types of questioned documents. Preliminary examination of documents. Basic tools needed for forensic documents' examination. B) Comparison of handwriting. Development of individuality in handwriting. Natural variations and fundamental divergences in handwritings. Class and individual characteristics. Comparison of paper, ink, printed documents, typed documents, Xeroxed documents. C) Alterations in documents, including erasures, additions, over-writings and obliterations. Indented and invisible writings. Charred documents. Disguised writing and anonymous letters.	7 Hrs	7 Marks	7. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. 8. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. 5. Any other innovative pedagogy as applicable
References:	1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). 2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 3. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). 4. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York (1995). 5. C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004). 6. Lee and Gaensslen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013) Weblinks:- 1. https://www.pbs.org/wgbh/nova/interactive/create-dna-fingerprint/ 2. https://www.public.asu.edu/~langland/forensics.html https://www.thirteen.org/edonline/ntti/resources/lessons/ladder/			

Model Questions:	Short Type 1) Enlist the duties of forensic scientist. 2) Write a note on Alterations in document. 3) Define: Chance Prints. 4) Describe Frye case and Daubert standard. 5) Discuss about the functions of Forensic Science 6) What is Forensic Science? Enlist the branches in Forensic Science. 7) Give the class and individual characteristics of handwriting. 8) Write about Questioned Documents. 9) Discuss about crime scene and it's types. 10) Give fundamental principle of fingerprint.
	Long Type 1) Discuss the principles of forensic science. 2) Enlist different divisions in forensic science laboratories. 3) Write about different patterns of Fingerprint. 4) What is questioned documents. Enlist its types. 3. Enlist the types of photography of crime scene.
	MCQs for Internal Assessment 1) The sub-classification of fingerprint is found in how many percentage a. 30-35% b. 50-60% c. 10-20% d. 40-50% 2) Who is father of fingerprint in India a. Dr.Francis Galton b. Dr. Lalji Singh c. Edmond Locard d. Albert Osborn 3) Who gave law of exchange? a. Edmond Locard b. Alphonse Bertillon c. William Henry d. William Blackstone 4) Gait Patten is also called as a. khoje'spatten b. lip pattern c. foot pattern d. fingerprint pattern 5) Science of identification of through the examination of fingerprint is known as a. photography b. cheiloscopy c. dactyloscopy d. microscopy 6) The study of lip prints are called as a. Cheiloscopy b. serology c. spectroscopy d. toxicology 7) 1st state forensic science laboratory at Calcutta was established in the years a. 1957 b. 1952 c. 1898 d. 1888 8) Which of the following evidence will be sent to forensic biology lab for analysis a. DNA sample b. hair sample c. blood sample d. both b and c

Course Category: Major LAB- I

117201 Basics of Forensic Science Practical-Lab I

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117201	Basics of Forensic Science Practical-Lab I	2	60	4 Hrs	25+25=50
Course Objectives:		The objective of this practical paper is to have practical knowledge about crime scene preservation, finger printing, different search methods sketching and reconstruction of different crime scenes.					
Course Outcomes:		After completion of the practical students will know about: 1. The working and functioning of Forensic science laboratories 2. Search methods used in outdoor, indoor and mobile crime scene. 3. Documentation of outdoor crime scene 4. Sketching of indoor crime scene. 5. Crime scene reconstruction methods. 6. Students will able to learn how the Principles of Forensic science used to solve criminal cases. 7. Understand the Fingerprints and how Fingerprint helps in identification of criminal. 8. Students will acquire skills to search and collect the evidences, finding individual characteristics in different evidences.					
Unit System		Contents					
Tutorial and Discussion		Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyzed using various methods.					
Basics of Forensic Science Practical		1. To prepare report of FSL/ police station visit. 2. To perform investigation of indoor crime scene. 3. To perform investigation of outdoor crime scene. 4. To record plain and rolled fingerprints. 5. To identify core and delta of the given fingerprint sample. 6. To enumerate the patterns of fingerprints. 7. To examine ridge characteristics of the given fingerprint pattern. 8. To examine forgery of the given samples. 9. To identify class characteristics of the given handwriting sample. 10. To identify individual characteristics of the given handwriting sample.					
References:		1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). 2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 3. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). 4. C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004). 5. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013) 6. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 7. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).					
Model Questions:		NA					

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment	
• Active participation in activities	10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	10 Marks
• Submission of duly certified practical record	05 Marks
Total	25 Marks
*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations	
Section 2: External Assessment	
• Exercise 1	10 Marks
• Exercise 2	10 Marks
• Viva-Voce (external)	05 Marks
Total	25 Marks

Course Category: GE/OE (Theory)-1

117202 Criminology I

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117202	Criminology I	2	30	2 Hrs	30+20=50

Course Objectives:	After studying this paper, the students will know – 1. The importance of criminology. 2. The causes of criminal behavior. 3. The significance of criminal profiling to mitigate crime. 4. The consequences of crime in society. 5. The elements of criminal justice system.				
Course Outcomes:	Students will able to- 1. Understand basic concepts of criminology. 2. Understand various crimes and the related terminologies. 3. Understand the process of police system after any crime. 4. Define the taxonomies and procedures related to criminology.				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	<i>Basic Concepts of Criminology</i> Definition, aims and scope. Theories of criminal behavior. Criminal anthropology. Criminal profiling.	8 Hrs	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. Explore virtual labs and simulations to enhance proper practice understanding. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions and problem-solving. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science.	
Unit II	<i>Introduction to Crime</i> Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder.	7 Hrs	7 Marks		
Unit III	<i>Investigative Criminology</i> Social change and crime. Understanding modus operandi. Investigative strategy. Police's power of investigation. Filing of criminal charges. Correctional measures and rehabilitation of offenders. Role of Media	8 Hrs	8 Marks		
Unit IV	<i>Taxonomy of Criminology</i> FIR, case diary, Summon, warrant, charge sheet, and its procedure, custody, parole probation.	7 Hrs	7 Marks		

References:	1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005). 2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton (2002). 3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice, Wiley, Chichester (1997). 5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (201
Model Questions:	Short Type 1) Write a note on Criminology. 2) Define FIR. 3) State the procedure of summon. 4) What is parole ? 5) Discuss about types of crime. 6) Write a note on Criminal Profiling. 7) Discuss about warrant. 8) Enlist the Elements of Crime. 9) Give a note on Organized crime. 10) What is deviant behaviour?
	Long Type 1) What is criminology? Discuss the theories of criminal behavior. 2) Discuss about understanding the Modus Operandi and Investigative Strategy. 3) Give a brief account on Correctional Measures and rehabilitation of Offenders. 4) Write about the Police's Power of Investigation and Filing of the Criminal Charges. 5) Write a note on: Criminal anthropology. 6) Elaborate the Role of Media. 7) Explain criminal profiling.
	MCQs for Internal Assessment 1) Definition of crime includes ____ a. Actus Reus b. Mens Rhea c. Both a and b d. None 2) Penology is study of ____ a. Crimes b. Punishments c. Victims d. Jailors 3) Juvenile delinquency is related to crime against ____ a. Children b. Adults c. Infants d. Animals 4) Article 51 A of Indian Constitution deals with a. Fundamental Rights b. Fundamental duties

	c. Directive Principles of State Policy d. None 5. FIR stands for ____ a. First Investigation Report b. First Information Report c. Fake Investigation Report d. Fake Information Report 6. Social variables in crime victimization includes ____ a. Social class, age, gender b. ethnicity, economic background c. Age, gender, economic background d. ethnicity, elegance, social class 7. The highest court in the land of India is ____ court. a. Supreme b. High c. Session d. District 8. Summons' procedure is mentioned in ____. a. CrPC b. IPC c. IEA d. None
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Course Category: GE/OE-2

117203 Applied Forensic Science

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117203	Applied Forensic Science	2	30	2 Hrs	30+20=50

Course Objectives:	After studying this paper, the students will know – 1. The fundamental principles on which the science of fingerprinting is based. 2. Fingerprints are the most infallible means of identification. 3. The method of classifying criminal record by fingerprints was worked out in India, and by Indians. 4. The methods of securing, searching and documenting crime scenes 5. The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes 6. The divisions in a forensic science laboratory. 7. The working of the forensic establishments in India and abroad. 8. The significance of foot, palm, ear and lip prints
Course Outcomes:	Students will be able to- 1. Understand the development, history, growth and scope of forensic science. 2. Understand the establishments of FSL and significance of blood stain spatter analysis. 3. Analyze the crime and crime scene management procedure. 4. Analyze the different methods of prints and impressions. 5. Explain the medicolegal importance of various crimes.

Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Organizational setup of Forensic Science A) Forensic science in International perspectives, including set up of INTERPOL and FBI. Scopes of Forensic Science. B) Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.	8 Hrs	8 Marks	1. Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. 3. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. Flip-Class: Assign readings or video lectures as home work and use class time for interactive discussions and problem-solving. 6. Ask students to create concept maps that illustrate

Unit II	<i>Criminalistics</i> A) The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how?). Crime scene logs. Crime Scene Management. Crime Scene Reconstruction. B) Securing and isolating the crime scene. Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes.s.	7 Hrs	7 Marks	the relationships between different concepts in forensic science. 7. Role playing: Act out scenarios.
Unit III	<i>Classification and Development of Fingerprint</i> A) Classification method for fingerprint record keeping. Automated Fingerprint Identification System Latent fingerprints' detection by physical and chemical techniques. B) Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Preservation of developed fingerprints.	8 Hrs	8 Marks	
Unit IV	<i>Other Impressions</i> A) Importance of footprints. Casting of foot prints, Electrostatic lifting of latent foot prints. B) Lip prints - Nature, location, types, collection and examination of lip prints. C) Ear prints and their significance. D) Palm prints and their historical importance.	7 Hrs	7 Marks	
References:	1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). 2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 3. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). 4. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York (1995). 5. C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004). 6. Lee and Gaensslen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013)			

Model Questions:	Short Type 1. Write a note on Forensic Science in International perspective. 2. Discuss the Hierarchical setup of Central Forensic Science Laboratories. 3. Discuss about the evaluation of 5Ws. 4. What is a Lip print? Enlist its types. 5. What is Fingerprint? Write about AFIS. 6. Discuss about Earprints. 7. Write a note on latent fingerprint. 8. State the searching methods of crime scene. 9. Write a note on sketching of crime scene.
	Long Type 1. Write a note on : a. Mobile Crime laboratories. 2. Explain gait pattern analysis. 3. Give detailed account on scope of Forensic Science. 4. Give a brief note on Crime scene management. 5. Discuss about crime scene management. 6. Elaborate about various techniques used for detection of latent prints.
	MCQs for Internal Assessment 1) Which of the following is searching method for finding physical evidence a. midrange b. baseline c. grid d. polar co ordinate 2) Which step is following after the collection of physical evidence done a. chain of custody b. documentation of crime scene c. searching of physical evidence d. collection of physical evidence 3) Chemical method used for development of fingerprint a. powder test b. cynoacrylate test c. silver nitrate test d. iodine fuming test 4) What are the types of photography a. over views b. midrange c. lose up d. all of the above 5) Blood stain from crime scene can be collected a. casting b. tape lifting c. swabbing d. photography 6) Which of the following comes under biological evidence a. cartilage case b. hair sample c. pesticides d. none 7) Central forensic science laboratory is not present at a. Pune b. Hyderabad c. Chandigarh d. Mumbai 8) Prints found on pliable surface are called a. visible print b. plastic print c. latent print d. fingerprint

Course Category: Skill Enhancement Course SEC-1
117204 Lab 2- (Advanced Forensic Science Practical)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	117204	Lab 2- (Advanced Forensic Science Practical)	2	60	--	50

Course Objectives:	The intended objectives are: 1. Aware the students about the essential safety protocols in a forensic laboratory. 2. Develop proficiency in fundamental forensic laboratory techniques. 3. Follow established SOPs for various forensic experiments. 4. Analyze experimental data and draw meaningful conclusions. 5. Apply critical thinking to troubleshoot and optimize experimental procedures.	
Course Outcomes:	At the end of this course students will be able: 1. To implement fundamental safety protocols, ensuring a secure working environment in the forensic laboratory. 2. To consistently follow established SOPs for various forensic experiments. 3. Students will maintain accurate and thorough records of experimental data, and analyze results to draw meaningful conclusions. 4. To maintain accurate and thorough records of experimental data, and analyze results to draw meaningful conclusions. 5. To apply critical thinking skills to identify and address challenges that may arise during experiments, showcasing the ability to troubleshoot and optimize procedures. 6. To gain insights into how forensic lab practices are applied in professional research or industrial settings, preparing them for future careers in diverse scientific and industrial fields. 7. Students will demonstrate ethical conduct in all aspects of laboratory work, emphasizing integrity, responsibility, and professionalism. 8. To gain insights into how forensic lab practices are applied in professional research or industrial settings, preparing them for future careers in diverse scientific and industrial fields.	
Unit System	Contents	Incorporation of Pedagogies
Experiments	1. To reconstruct the crime scene. 2. To study security features of Indian currency notes. 3. To develop fingerprint using powder method. 4. To develop fingerprint using chemical method. 5. To lift fingerprint using transparent tape. 6. To examine secret writing. 7. To perform gait pattern analysis. 8. To examine different lip prints. 9. To perform casting of footprint. 10. To perform tracing of footprints.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: • Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding of forensic applications. • Flipped Classroom Model: Encourage

		students to come to class prepared, promoting active participation. • Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • Technology Integration: Incorporate proper tools and techniques for forensic analysis and presentation. • Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices. • Inquiry based Learning: Explore topics through questioning, investigation and research • Case based Learning: Analyze and discuss real cases to apply theoretical knowledge • Any other innovative pedagogy as applicable
References:	1. Ordway, H. Scientific Examination of Questioned Documents-Forensic and Police Science Series. Elsevier: New York; (1981). 2. Hardless, H.R. and Rao, C.S. Disputed Documents, Handwriting and Thumbprint Identification: Profusely Illustrated. Law Book Publishing: Allahabad; (1988) 3. Lerinson, J. Questioned Documents-A Lawer's Handbook. Academic Press: London; (2000). 4. Bridges, B.C. Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Handwriting Expert Testimony, Opinion Evidence. University book Agency: Allahabad; (2000).	
Model Questions:	NA	

Distribution of Marks and the scheme of (SEC) Practical Examination is as follows:

Internal Assessment

• Active participation in activities	15 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	20 Marks
• Submission of duly certified practical record	10 Marks
• Internal examiner viva-voce	05 Marks
Total	50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Major (Theory)-2

117205 Basics of Forensic Chemistry and Toxicology

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117205	Basics of Forensic Chemistry and Toxicology	2	30	2 Hrs.	30 +20 =50

Course Objectives:	After studying this paper the students will know – 1. The classification and characteristics of the narcotics, drugs and psychotropic substances. 2. The methods of identifying narcotics, drugs and psychotropic substances. 3. The forensic identification of illicit liquors. 4. The significance of toxicological studies in forensic science. 5. The absorption of poisons in body fluids.
Course Outcomes:	Students will be able to – 1. Collect and preserve chemical evidences. 2. Investigate arson crime scene. 3. Classify the poisons and their modes of actions. 4. Identify the illicit liquors with forensically sound techniques. 5. Characterize the narcotics, drugs and psychotropic substances.

Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I		8 Hrs	8 Marks	1. Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts.
	Forensic Chemistry division and Chemical Evidences: Introduction to forensic chemistry and forensic chemistry division at FSL Food and food products, cement, pharmaceutical drugs, beverages, dyes, paints, fibres and ink as chemical evidences found at crime scene, their collection, preservation and analysis, interpretation of findings.			2. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization.

Unit II	Cases Involving Arson: Chemistry of fire. Conditions for fire. Fire scene patterns. Location of point of ignition. Recognition of type of fire. Searching the fire scene. Collection and preservation of arson evidence. Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Scientific investigation and evaluation of clue materials. Information from smoke staining.	7 Hrs	7 Marks	3. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. Flip-Class: Assign readings or video lectures as home work and use class time for interactive discussions and problem-solving. 6. Ask students to
Unit III	Poisons and Beverages: A) Classification of poisons. Physico-chemical characteristics and mode of action of poisons. Accidental, suicidal and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes. Collection and preservation of viscera, blood and urine for various poison cases. Identification of biocides and metal salts in body fluids. Metabolism and excretion of poisons. Application of immunoassays in forensic work. Animal poisons. Snake venom. Mode of action. Carbon monoxide poisoning. Vegetable poisons. Poisonous seeds, fruits, root and mushrooms. B) Beverages. Alcoholic and non-alcoholic illicit liquors. Analysis and identification of ethyl alcohol. Estimation of ethyl alcohol in blood and urine. Proof spirit. Crime scene management in illicit liquor cases.	8 Hrs	8 Marks	create concept maps that illustrate the relationships between different concepts in forensic science. 7. Role playing: Act out scenarios.

Unit IV	<i>Narcotic Drugs, Psychotropic Substances:</i> Definition of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Natural, synthetic and semi-synthetic narcotics, drugs and psychotropic substances. Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs and psychotropic substances.	7 Hrs	7 Marks
References	1. A. A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995). 2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 3. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 4. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983). Weblinks: • https://www.sciencedirect.com/journal/forensic-chemistry • https://www.acs.org/careers/chemical-sciences/fields/forensic-chemistry.html • http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/forensic_science/05_forensic_chemistry_and_explosives/31_explosives_introduction/et/4742_et_4742_et_31et.pdf • https://www.legalserviceindia.com/legal/article-13434-arson-investigation-unveiling-truth-in-the-flames.html		
Model Questions :	Short Type 1) Write about forensic chemistry and the forensic chemistry division in FSL. 2) Explain cement analysis. 3) Define : Psychotropic substances 4) State the example of Synthetic drugs. 5) Enlist the significance of toxicological findings. 6) Discuss Testing of Narcotics.		
	Long Type 1) Discuss various chemical evidences and their findings. 2) Write about Fire, its conditions, patterns and location of ignition. 3) Discuss about the investigation of Narcotic drugs and Psychotropic substances. 4) Give a broad classification of narcotic drugs with proper examples. Write about collection, preservation and testing of Narcotic drugs.		
	MCQs for Internal Assessment 1) The most common cause for arson is a. Insurance Fraud b. Pyromania c. Revenge d. Vandalism 2) The fundamental chemical reaction for fire initiation is a. Hydroxylation		

	b. Oxidation c. Combustion d. Ignition 3) Debris material collected from arson crime scene should be packed in a. Sealed paper bag b. Plastic bag c. Cloth bag d. Metal box with tight lid 4) Adulteration of gasoline with kerosene oil can be detected by: a. TLC b. GLC c. HPLC d. HPTLC 5) Which of the body secretion is not involved in drug detection? a. urine b. blood c. saliva d. ear wax 6) Which is not a feature of aconite poisoning? a. Chest pain b. Increased blood pressure c. Tingling and numbness d. Hyper salivation 7) Blindness can be caused by a. Ethyl alcohol b. Methyl alcohol c. Glycol d. Propanol
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Course Category: Major Lab 3

117206 Basics of Forensic Chemistry and Toxicology Practical- Lab 3

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117206	Basics of Forensic Chemistry and Toxicology Practical- Lab 3	2	60	4 h	25+25=50

Course Objectives:	The intended objectives are: 1. To introduce techniques and methods used in a forensic practical. 2. To understand the importance of security measures while performing any analysis. 3. To identify and comprehend the major methods and techniques applied during the practices. 4. To gain knowledge about various applications employed in commercial forensic analysis.	
Course Outcomes:	At the end of this course students will be able: 1. Provide services in forensic science laboratories 2. Create case report for arson and explosive cases. 3. Analyse cement samples. 4. Use chromatographic techniques to separate different samples. 5. Perform food adulteration test. 6. Learn how the Principles of Forensic science used to analyze different samples.	
Unit System	Contents	Incorporation of Pedagogies
Content/Experiments	1. To analyze the cement samples. 2. To prepare a case report on arson case. 3. To carry out analysis of explosive substances. 4. To separate explosive substances using thin layer chromatography. 5. To perform adulteration testing of various food samples. 6. To prepare a case report on bomb blast case. 7. To examine petroleum products. 8. To examine ink sample using paper chromatography. 9. To examine ink sample using thin layer chromatography. 10. To carry out qualitative estimation of arson samples.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of various applications and methods of forensic analysis. A few suggested pedagogies are: • Guest Lectures: Invite experts in forensic and inspection to discuss real-world scenarios and challenge • Practical Experiments: Hands-on experiments on forensic lab practices • Lab Reports: Students prepare detailed lab reports on their findings. • Discussion Sessions: Group discussions on the implications of different adulterants. • Case Studies: Analyze case studies on the related forensic topics. • Group Projects: Assign group projects to research specific forensic subjects. • Class Debates: Discuss various significances of forensic branches.

References:	1. A. A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995). 2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 3. W. J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 4. Beveridge, A: Forensic Investigation of Explosives, Taylor & Francis, 2000. 5. Yallop, H. J: Explosion Investigation, Forensic Science Society & Scottish Academic Press, (1980). 6. Yinon, J. and Zitrin, S: The Analysis of Explosives, Oxford: Pergamon, (1981).
Model Questions:	NA

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

• Active participation in activities	10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	10 Marks
• Submission of duly certified practical record	05 Marks
Total	25 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise 1	10 Marks
• Exercise 2	10 Marks
• Viva-Voce (external)	05 Marks
Total	25 Marks

Course Category: Open Elective-3

117207 Applied Forensic Chemistry and Toxicology

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117207	Applied Forensic Chemistry and Toxicology	2	30	2 Hrs	30+20 =50

Course Objectives:	After studying this paper, the students will know- 1. The methods of analyzing contaminants in petroleum products. 2. The classification and characteristics of the narcotics, drugs and psychotropic substances. 3. The methods of identifying narcotics, drugs and psychotropic substances. 4. The forensic identification of illicit liquors. 5. The significance of bomb scene management.			
Course Outcomes:	At the end of this course students will be able: 1. Analyze trace amounts of petroleum products in crime scene evidence. 2. Collect and preserve chemical evidences. 3. Investigate bomb blast crime scene. 4. Classify explosives, including the synthesis and characterization of representative analogs.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	<i>Petroleum and Petroleum Products:</i> Distillation and fractionation of petroleum. Commercial uses of different petroleum fractions. Analysis of petroleum products. Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products.	8 Hrs	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. Hands-On Models: Making of models of dummy crime scenes.
Unit II	<i>Explosives:</i> Classification of explosives –low explosives and high explosives. Homemade explosives. Military explosives. Blasting agents. Synthesis and characteristics of TNT, PETN and RDX. Explosion process. Blast waves. Bomb scene management. Searching the scene of explosion.	7 Hrs	7 Marks	Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve problems. Explore forensic science laboratories and understanding working and organization of forensic chemistry and toxicology division.
Unit III	<i>Concepts of Toxicology:</i> Significance of toxicological findings. Techniques used in toxicology. Toxicological analysis and chemical	8 Hrs	8 Marks	

	intoxication tests. Postmortem Toxicology. Dose-response relationship. Lethal dose 50 and effective dose 50.			Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions and problem-solving. Ask students to create concept maps that illustrate the relationships between different concepts in forensic chemistry.
Unit IV	<i>Investigation of Narcotic Drugs, Psychotropic Substances:</i> Crime scene search for narcotics, drugs and psychotropic substances – searching a suspect, searching a dwelling, searching a vehicle. Clandestine drug laboratories. Collection and preservation of drug evidence. Testing of narcotics, drugs and psychotropic substances. Isolation techniques for purifying narcotics, drugs and psychotropic substances – thin layer chromatography, gas-liquid chromatography and high performance liquid chromatography. Presumptive and screening tests for narcotics, drugs and psychotropic substances. Microcrystalline testing of drugs of abuse. Analysis of narcotics, drugs and psychotropic substances in breast milk, saliva, urine, hair and antemortem blood. Drugs and driving. Dope tests. Analysis of narcotics, drugs and psychotropic substances in postmortem blood. Postmortem changes affecting the analysis of narcotics, drugs and psychotropic substances.	7 Hrs	7 Marks	

References:	1. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 2. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983). 3. S.B. Karch, The Pathology of Drug Abuse, CRC Press, Boca Raton (1996). 4. A. Poklis, Forensic toxicology in, Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997). 5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988). 6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). Weblinks: http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/forensic_science/05._forensic_chemistry_and_explosives/03._cases_encountered_in_forensic_chemistry_drugs/et/4731_et_4731_et_03et.pdf
Model Questions:	Short Type 1) What is Forensic Toxicology? Discuss its significance. 2) Give a brief account on thin layer chromatography. 3) Define : Psychotropic substances. 4) State the example of Synthetic drugs. 5) Enlist the significance of toxicological findings. 6) Discuss testing of narcotics. 7) State the Dope test. 8) Enlist the Classification of Explosives.
	Long Type 1) Discuss various chemical evidences and their findings. 2) Write a note on Synthesis and Characteristics of various explosives. 3) Discuss about Bomb scene management and searching of the scene of explosion. 4) Explain principle of gas liquid chromatography.
	MCQs for Internal Assessment 1) Which enzyme converts alcohol to acetaldehyde in body? a. Peptase b. Alcohol dehydrogenase c. Alcohol hydrogenase d. Aldehyde hydrogenase 2) A device that uses breath sample for determining BAC is a. Respirometer b. Breath analyzer c. Kozelkahine apparatus d. Respiratory detection apparatus 3) The brick red colour of postmortem lividity is seen in poisoning due to a. Carbon monoxide b. Hydrogen sulphide c. Phosphorous d. Cyanide 4) Which of the following is not a petroleum product? a. Bitumen b. Wax c. Petrol

	d. TATP 5) Adulteration of gasoline with kerosene oil can be detected by: - TLC - GLC - HPLC - HPTLC 6) TNT stands for - TriNitro toluene - tetra nitro toluene - tri nano tree - tetra nano toluene 7) Which is not an explosive ? - TNT - PETN - Nitrogen - RDX 8) Dope test for sports persons is performed by _____ - TADA - NATA - WADA - None
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Course Category: Generic/ Open Elective – 4

117208 Criminology II

Level	Semester	Course Code	Course Name		Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117208	Criminology II		2	30	2 Hrs	30+20 = 50

Course Objectives:	After studying this paper the students will know- 1. The importance of criminology. 2. The causes of criminal behavior. 3. The significance of criminal profiling to mitigate crime. 4. The consequences of crime in society. 5. The elements of criminal justice system.			
Course Outcomes:	Students will be able to- 1. Understand basic concepts of criminology. 2. Understand various crimes and the related terminologies. 3. Understand the process of police system after any crime. 4. Define the taxonomies and procedures related to criminology.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	<i>Laws and Constitution of India</i> A) Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. B) Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. C) Criminal Procedure Code. Section 293 in the code of criminal procedure. Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A.	8 Hrs	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. Hands-On Models: Making of models of dummy crime scenes. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve problems.
Unit II	<i>Types of offences</i> A) Classification – civil, criminal cases. Essential elements of criminal law. Cognizable and non-cognizable offences. Bailable and non-bailable offences. compoundable and non-compoundable offences. B) Organized crime, professional crime, occupational crime, crime against women, juvenile delinquency.	7 Hrs	7 Marks	Explore forensic science laboratories and understanding working and organization of forensic chemistry and toxicology division. Flip-Class: Assign readings or video lectures
Unit III	<i>Penology</i> Punishments, Capital punishments	8 Hrs	8 Marks	

	in India, IPC (Indian penal code), Indian police system, Hierarchy of Indian courts.			as homework and use class time for interactive discussions and problem-solving.
Unit IV	Victimology Victims, Survivors and it's types. Social variables in crime victimization (social class, age, gender, ethnicity). Impact of Crime.	7 Hrs	7 Marks	Ask students to create concept maps that illustrate the relationships between different concepts in forensic chemistry.
References:	1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005). 2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton (2002). 3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice, Wiley, Chichester (1997). 5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (2014)			
Model Questions:	Short Type 1) Write about the social variables in crime victimization. 2) Differentiate between civil and criminal cases. 3) Discuss about criminal procedure code. 4) Differentiate between cross examination and re-examination. 5) Define : Victimology. 6) What is penology ? 7) Give the definition of Juvenile delinquency. 8) State Sec 293 in CrPC. 9) What is Professional crime? 10) Discuss about the Impact of Crime. 11) What is Expert Witness?			
	Long Type 1) Write a note on Indian Evidence Act and Rules of relevancy in brief. 2) Discuss about offences and enlist its types. 3) Classify different types of crime. 4) Elaborate Criminal Procedure Code and write about Sec. 293 in the Code of Criminal Procedure. 5) Write a note on: Capital punishments in India 6) State the Directive Principles of State policy in brief.			

MCQs for Internal Assessment

- 1) The study of the personality of the offenders in physical terms is
 - a. Criminal sociology
 - b. Penology
 - c. Criminal Anthropology
 - d. All of the above
- 2) Halocaust is considered as
 - a. Crime against humanity
 - b. International crime
 - c. Crime against property
 - d. Cyber crime
- 3) Who coined the term Criminology?
 - a. Adler
 - b. Sutherland
 - c. Lombroso
 - d. Becker
- 4) When did Indian Penal Code received the Governor General's Assent/
 - a. October 3, 1850
 - b. October 5, 1852
 - c. October 6, 1860
 - d. October 7, 1865
- 5) Theories of criminal behaviour are ____
 - a. Biological
 - b. Psychological
 - c. Sociological
 - d. All of the above
- 6) Service of summons is given in ____
 - a. 31 A CrPC b. 31 A IPC
 - c. 51 IPC d. 51 CrPC
- 7) Leading questions can be asked during
 - a. Re-examination b. Examination in chief
 - c. Cross examination d. None of the above
- 8) Constitution of India was enacted in the year _____.
 - a. 1950 b. 1949
 - a. c. 1990 d. 2000

Course Category: Vocational Skill Course VSC-1
117209 (Lab 4- Applied Forensic Science Practical)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117209	(Lab 4- Applied Forensic Science Practical)	2	60	4 h	50

Course Objectives:	The objective of this practical paper is to have practical knowledge about various examination techniques.	
Course Outcomes:	At the end of this course students will be able to: 1. Provide services in forensic science laboratories. 2. Create case report for criminal cases. 3. Analyse questioned document samples. 4. Use sophisticated techniques to separate different samples. 5. Make sketches of crime scene . 6. Learn how the Principles of Forensic science used to analyze different samples.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	1. Introduction to knowledge about different examination techniques to analyse various samples. 2. Importance of evidence analysis.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic chemistry lab practices. A few suggested pedagogies are: •Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. •Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding. •Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. •Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. •Technology Integration: Incorporate digital tools for data analysis and presentation. •Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic chemical lab practices.
Forensic Chemistry Practical	1. To prepare fingerprint chart. 2. To make druggist fold. 3. To make numbering blocks for crime scene practical. 4. To examine security features of passport. 5. To examine security features of plastic money. 6. To study primary classification of fingerprints. 7. To write a case study on crime. 8. To study types of searching methods of crime scene evidence. 9. To study types of photography. 10. To study methods of sketching.	

References:	1. A. A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995). 2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 3. W. J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 4. Beveridge, A: Forensic Investigation of Explosives, Taylor & Francis, 2000. 5. Yallop, H. J: Explosion Investigation, Forensic Science Society & Scottish Academic Press, (1980). 6. Yinon, J. and Zitrin, S: The Analysis of Explosives, Oxford: Pergamon, (1981).
Model Questions:	NA

Distribution of Marks and the scheme of (VSC) Practical Examination is as follows:

Internal Assessment

• Active participation in activities	15 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	20 Marks
• Submission of duly certified practical record	10 Marks
• Internal examiner viva-voce	05 Marks
Total	50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Skill Enhancement Course SEC-2

117210 (Lab 5- Applied Forensic Chemistry and Toxicology Practical)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	117210	(Lab 5- Applied Forensic Chemistry and Toxicology Practical)	2	60	--	50

Course Objectives:	The intended objectives are: 1. To introduce glasswares and evidence packaging materials. 2. To prepare case reports on various poisoning cases. 3. To create awareness regarding alcoholic and non- alcoholic beverages. 4. To analyse the reports of analytical techniques.		
Course Outcomes:	After completion of the course, the learner will able to: 1. Prepare TLC plates. 2. Identify the various components present in cement samples. 3. Apply analytical techniques for the analysis of beverage samples. 4. Acquire the necessary basic skills for performing TLC.		
Unit System	Content/ Experiments	Incorporation of Pedagogies	
Calibration of glassware, instruments and standardization of solutions	1. To make silica gel for TLC. 2. To prepare TLC plates on glass slides. 3. To prepare solvent system for paper chromatography. 4. To prepare solvent system for TLC. 5. Handling of petroleum samples. 6. Packaging and sealing of glass vials/ test tubes. 7. To prepare cement blocks. 8. Prepare extract of plant poisons. 9. To study principle and working of UV Visible spectrophotometer. 10. To study composition of different alcoholic beverages.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: • Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding of forensic applications. • Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. • Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • Technology Integration: In corporate proper tools and techniques for forensic analysis and presentation. • Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices. • Inquiry based Learning: Explore topics through questioning, investigation and research • Case based Learning: Analyze and discuss real cases to apply theoretical knowledge Any other innovative pedagogy as applicable	

References:	1. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013). 2. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983). 3. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988). Web resource: https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.html
Model Questions:	NA

Distribution of Marks and the scheme of (SEC) Practical Examination is as follows:

Internal Assessment

The 50 marks fragmentation as follows:

• Active participation in activities	15 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	20 Marks
• Submission of duly certified practical record	10 Marks
• Internal examiner viva-voce	05 Marks
Total	50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI



Degree of Bachelor of Science
Forensic Science
Semester III and IV

FACULTY: SCIENCE AND TECHNOLOGY

(Courses effective from Academic Year 2025-26)
Under NEP 2020 (As per Uniform NEP Scheme)

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TLE Scheme for SECOND YEAR: SEMESTER – III (Level 5.0)

Subject	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract (Total)	
						External		Internal			
						Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Forensic Science	Major-T	117211	Forensic Physics	2	2	30	9	20	6	50	20
Forensic Science	Major-T	117212	Forensic Ballistics	2	2	30	9	20	6	50	20
Forensic Science	IKS-T	117213	IKS in Forensic Science	2	2	30	9	20	6	50	20
Forensic Science	Major-P	117214	Forensic Physics Lab 6	2	4	25	10	25	10	50	20
Forensic Science	Minor-T	117215	Minor Forensic Physics and Ballistics	2	2	30	9	20	6	50	20
Forensic Science	Minor-P	117216	Minor Forensic Physics Lab 7	2	4	25	10	25	10	50	20
Forensic Science	GOEC-T	117217	Forensic Science for competitive Exam	2	2	30	9	20	6	50	20
Forensic Science	VSC-P	117218	Forensic Science Lab 8	2	4	-	-	50	20	50	20
Forensic Science	FP/CES	117219	Forensic Science Lab 9 (FP/ CEP in Forensic Science - I)	2	4	-	-	50	20	50	20
Forensic Science	CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Important: * VSC Should be Complementary to Major

** SEC has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor

TLE Scheme for SECOND YEAR: SEMESTER – IV (Level 5.0)

Subject	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract	
						External		Internal		(Total)	
						Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Forensic Science	Major-T	117220	Forensic Biology-1	2	2	30	9	20	6	50	20
Forensic Science	Major-T	117221	Forensic Biology-2	2	2	30	9	20	6	50	20
Forensic Science	Major-T*	117229*	Techniques in Forensic Biology- 3	2	2	30	9	20	6	50	20
Forensic Science	Major-P	117222	Forensic Biology Lab 10	2	4	25	10	25	10	50	20
Forensic Science	Minor-T	117223	Forensic Biology	2	2	30	9	20	6	50	20
Forensic Science	Minor-P	117224	Minor Forensic Biology Lab 11	2	4	25	10	25	10	50	20
Forensic Science	GOEC-T	117225	Advanced Techniques in Forensic Science	2	2	30	9	20	6	50	20
Forensic Science	VSC-P	117226	Hands on Techniques in Advanced Forensic Biology Lab 12	2	4	-	-	50	20	50	20
Forensic Science	SEC-P#	117227 [#]	Forensic Biology Lab 13	2	4	-	-	50	20	50	20
Forensic Science	FP/CES	117228	Forensic Science Lab 14 (FP/ CEP in Forensic Science - II)	2	4	-	-	50	20	50	20
Forensic Science	CC		Separate SOP shall be consulted from University website	2	4	-	-	50	20	50	20

*** To be implemented w.e.f. academic session 2026-27**

- Only applicable up to academic session 2025-26

Important: VSC Should be Complementary to Major and SEC has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor

Examination and Assessment Process:

- i. The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- ii. Exit options are provided with Certificate, Diploma and Basic Bachelor’s degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor’s degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- iii. For the smooth success of four-year degree programme with multiple entry and exit systems, the examination mode should be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit) examination modes in line with the UGC Report on ‘Evaluation Reforms in Higher Educational Institutions (2019).

Examination, Evaluation and Assessment Scheme

The total marks for each Course shall be based on Continuous Assessment and Semester End Examination. Each theory course of Major, Minor, GE/OE, AEC, IKS, VEC as mentioned in **Teaching Learning Scheme** prepared by the Board of Studies shall be evaluated as per the scheme as mentioned in the following table

Examination, Evaluation and Assessment Scheme														
Vertical No.	The Vertical	Mode of Examination, Evaluation & Assessment	Theory				Theory (Total)		Practical				Practical (Total)	
			External		Internal				External		Internal			
			Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
a	Major	External & Internal	30	9	20	6	50	20	25	10	25	10	50	20
b	Minor		30	9	20	6	50	20	25	10	25	10	50	20
c	Generic/ Open Elective		30	9	20	6	50	20	--	--	--		--	--
d	VSC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	SEC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
e	AEC (Eng. & One MIL Composite)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	IKS (Generic)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	VEC	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
F	FP/CEP	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	Internship/ Apprenticeship		Assessment of these verticals shall be based on various activities/practices. It shall be evaluated by giving maximum marks of 50 per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process is prescribed for Phase I and Phase II											
	CC													

Continuous Assessment Tests (CAT)

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under-

- i. Three CAT each of 8 / 10 Marks (Theory) as applicable and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days.
- ii. Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- iii. Total Performance in CAT (i.e. 40 %) shall be based on the **best two out of three** in CAT examinations
- iv. Internal assessment shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, record book, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

Conduction of the Examination:

As per the scheme of teaching, learning, examination and evaluation, theory/practical examinations of Semester-I, II, III, IV, V, VI, VII and VIII shall be conducted by the University (except for Internal Examinations as applicable) at the end of each semester.

The theory/practical examinations of all the Semesters shall be held as per the following Schedule –

Sr. No.	Name of the Examination	End Sem Examination	Supplementary Examination*
1	Semester-I, III, V and VII	Winter	Summer
2	Semester-II, IV, VI and VIII	Summer	Winter

* The University may evolve mechanism for conducting repeat end semester examination. Such repeat examinations shall have to be conducted within one month of the regular even semester examination and on demand examination.

1. The practical examination of all semesters shall be conducted by the University at the end of each semester. The HEI shall conduct the Practical examination of odd semesters as per the schedule announced by the University. **However, the appointment of the External and Internal Examiners shall be done by the Head or Principal of respective HEI to conduct external examination of the odd semester and the same should be communicated to the University before commencement of the practical examination.** The University shall conduct the external practical examination of all even semester by appointing external and internal examiners.
2. The examinations specified above shall be held twice in a year at such places and on such dates as may be prescribed by the University.
3. An applicant to an examination specified above, shall pursue a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College/Institute/University department.
4. Provided that the student shall be eligible to appear for examination if -
 - a. He/she complies with the provisions of the Ordinance pertaining to the Examination in general from time to time.
 - b. He/she has prosecuted a regular course of study in a university department/college affiliated to the University.
 - c. He/she has in the opinion of the Principal shown satisfactory progress in his/her studies.
5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be *mutatis-mutandis* applicable to every collegiate/non-collegiate student.
6. The fees for each theory examination and practical examination conducted by the university shall be as prescribed by the University, from time to time.

Course Category: Major (Theory)

117211 Forensic Physics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117211	Forensic Physics	2	30	2 Hrs	30 +20 =50

Course Objectives:	After studying this course, the students will know– 1. The classification and characteristics of different trace evidences 2. The advancements in forensic physics. 3. The methods for identification of trace evidences. 4. The significance of microscope and photography in forensic investigation.
Course Outcomes:	Students will be able to– 1. Understand the fundamental principles of physics and their application to forensic science. 2. Knowledge of the types of physical evidence and their analysis, such as fingerprints, footprints, and tool marks. 3. Understanding of the principles of projectile motion and their application to forensic ballistics. 4. Knowledge of the physical properties of materials and their analysis, such as metals, plastics, and fabrics.

Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
UNIT I	❖ Trace Evidences Physical Properties of Materials: Composition, Temperature, Weight and Mass, Density, Refractive Index, Classification, Collection and Preservation and their Forensic Importance. • Glass: Classification of Glass Samples, Glass Fractures, Collection and Preservation of Glass Evidence and Forensic significance • Soil: Variations in Soil, Collection and Preservation of Soil Evidence, Forensic Significance. • Fiber: Types, Identification and Comparison of Manufactured Fibers (Microscopic Examination, Dye Composition, Chemical Composition, Other Properties for Examination), Significance of Match, Collection and Preservation of Fiber Evidence. Forensic significance • Paint: Composition of Paint, Classification of Common Paints, Significance of Soil Evidence, Analytical Tools used in Paint Comparison, Collection and Preservation of Paint Evidence, Forensic significance	8 Hrs.	8 Marks	• Multimedia presentations, interactive slides, • and animations to illustrate complex concepts. • Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. • Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. • Explore virtual labs and simulations to enhance proper practical understanding. • Flip-Class: Assign readings or video lectures as home work and
UNIT II	• Tools & Tool Marks Common Hand Tools: Levers (Screw Drivers, Crow Bars, Pry Bars, Nail Pullers, Pinch Bars, Molding Bar, Wrecking Bar), Hand Saw (Rip Saw, Cross Cutting Saw, Bow Saw, Teeth Saw, Compass Saw, Dip Cut, Coping Saw, Wall Board Saw, Bow Saw, Hacksaw, Chisel Teeth Saw, Coarse Cut Carpenter Saw), Striking Tools (Hammers, Hatches and Axes), Grasping Tools (Wrenches, Vise Grips, Pliers), Cutting Tools (Metal Snips, Wire Cutters, Bolt and Cable Cutters), Crimping Tools, Knives, Scissors and Shears, Chisels and Punches, Drill Bits. • Tool Marks: Marks Made by Hand Tools (Impression / Compression Marks, Dent, Saw Marks, Drill Marks and Holes, Punctures, Point to Point Blade Cut Marks, Scratch and Scour Marks), Collection, Documentation and Forensic Examination of Tool Marks.	8 Hrs.	8 Marks	

UNIT III	• Vehicular Accidents: Primary Causes of Road Accident, Types of Road Accident, Sources of Information, Eye Witnesses, Tire and Other Marks, Pedestrian Impacts and	7 Hrs	7 Marks	use class time for Interactive discussions and problem-solving
	Vehicle Speed and damage, Vehicle Condition, Types of Skid Marks, Curved Scuffmarks, Speed Estimation from Skid/Scuffmarks. Peripheral Vision of a Driver, Brake System and Steering Failure, Motor Vehicle Examination. • Rail Accidents: Investigation of Rail Crash: Criminal and Safety Investigation, Investigation Principles, Best Practices: Tests, Inspection of Driving Cab, Examination of Electrical/Electronic/Technological system and their Failure. Necessary equipment required for forensic examination.			• Ask students to create concept maps that illustrate the relationships between different concepts in forensic science. • Role playing: Act out scenarios
UNIT IV	• Microscopy Principle, Working, Advantages and Disadvantages of Optical Microscopes: Stereomicroscope, Polarizing Microscope, Phase Contrast Microscope and Comparison Microscope. Advanced Microscopes: Scanning Electron Microscopes (SEM), Transmission Electron Microscope (TEM), X-Ray Diffraction (XRD), Fourier Transform Spectrophotometer (FTIR). • Photography: Introduction, 35 Mm Film / Digital SLR Camera, Digital Photo Imaging, ISO Number, Exposure Index, Photo Imaging Evidence; Angle, Scale, Depth of Field, Light, Ambient Light, Color Temperature, Flash/ Strobe, Photography of Footwear Impressions, Crime Scene Investigation Report Writing. Forensic Image Processing and Analysis.	7 Hrs.	7 Marks	
References	1. W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988). 2. A.J. Schwoeble and D.L. Exline, Current Methods in Forensic Gunshot Residue Analysis, CRC Press, Boca Raton (2000). 3. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000). 4. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). Web links 1. http://www.aafs.org/sections/physics-and-engineering-sciences 2. http://www.iafs.org/sections/physics-and-engineering 3. http://link.springer.com 4. http://www.forensicsciencesimplified.org 5. http://dfsl.maharashtra.org.in			
Model Questions:	Short Type 1) What is the primary goal of trace evidence analysis in forensic science? 2) What is the term for the process of analyzing soil to determine its origin? 3) Where are tool marks commonly found? 4) Which hand tool produces an impression mark? 5) What is the primary cause of vehicular accidents? 6) What is the term for the investigation of a rail accident? 7) Which type of camera is best suited for capturing high-quality images in low-light conditions? 8) What is the term for the process of adjusting the camera's exposure compensation to capture a well-balanced image? 9) What is the term for the process of adjusting the camera's focus to ensure a sharp image? 10) What is a purpose of the condenser lens in a microscope?			

	Long Type 1) Explain the principles of paint analysis and describe the methods used to examine and compare paint samples found at crime scenes. Discuss the importance of paint analysis in forensic science and provide examples of how it has been used in real-life criminal investigations. 2) Explain the principles of analyzing and comparing footwear impressions and explain how it can be used to link a suspect to a crime scene. Discuss the different types of footwear impression analysis, such as size and shape comparison and tread pattern analysis, and provide examples of how footwear impression analysis has been used in real-life criminal investigations. 3) Describe the process of hair analysis and explain how it can be used to identify an individual or
	link a suspect to a crime scene. Discuss the different types of hair analysis, such as microscopic examination and DNA analysis, and provide examples of how hair analysis has been used in real-life criminal investigations. 4) Discuss the differences between various types of cameras, including DSLRs, mirrorless cameras, and point-and-shoot cameras. Explain the advantages and disadvantages of each type of camera and describe the situations in which each is best used. 5) Explain the concept of street photography and discuss the techniques used to capture candid images of people in public places. Describe the role of observation, anticipation, and timing in street photography. 6) Discuss the importance of photography in forensic science and explain how photographs are used as evidence in criminal investigations. Describe the techniques used to analyze and enhance photographic evidence. 7) Discuss the role of tool mark analysis in forensic investigations, including its use in linking suspects to crime scenes and reconstructing crimes. Provide examples of how tool mark analysis has been used in notable cases. 8) Explain the concept of "class characteristics" and "individual characteristics" in tool mark analysis. Provide examples of each and describe how they are used to identify the source of a tool mark. How do forensic examiners use these characteristics to determine if a tool mark was made by a specific tool? 9) Explain the concept of "tool mark identification" and describe the process of comparing known and unknown tool marks. What are the different levels of identification that can be made in tool mark analysis, and what are the criteria for each level? 10) Describe the role of human factors in rail accident investigation. How do investigators consider the role of human error, training, and procedures in contributing to a rail accident? 11) Describe the role of biomechanics in vehicular accident investigation. How do investigators use biomechanical analysis to determine the causes and effects of injuries sustained in an accident? 12) Describe the process of investigating a vehicular accident, including the steps taken to document the scene, collect evidence, and interview witnesses. How do investigators determine the cause of the accident and assign fault?

	MCQs for Internal Assessment 1. Which of the following is a common technique used in forensic physics to analyze the origin of a fracture? A) Fracture mechanics B) Materials analysis C) Stress analysis D) Failure analysis 2. What is the term for the process of analyzing the thermal properties of a material, such as its conductivity and specific heat? A) Thermal analysis B) Thermodynamics C) Heat transfer analysis D) Forensic thermal analysis 3. Which of the following is an example of a forensic physics technique used to analyze the authenticity of a document? A) Handwriting analysis B) Ink analysis C) Paper analysis D) All of the above 4. What is the term for the process of analyzing the physical properties of a material, such as its density and hardness? A) Materials analysis B) Physical analysis C) Chemical analysis D) Forensic analysis 5. Which of the following is a common technique used in forensic physics to analyze the origin of a fire? A) Thermography B) Spectroscopy C) Chromatography D) Acoustic analysis 6. What is the primary goal of forensic physics in criminal investigations? A) To analyze DNA evidence B) To reconstruct crime scenes C) To analyze physical evidence and apply scientific principles to aid in investigations D) To interview witnesses 7. Which of the following is a common type of vehicle accident? A) Rear-end collision B) Head-on collision C) Rollover D) All of the above
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Course Category: Major (Theory)
117212 Forensic Ballistics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117212	Forensic Ballistics	2	30	2 Hrs.	30 +20 =50

Course Objectives:	After studying this paper, the students will know– 1. To apply the principles of physics to the analysis of evidence in criminal investigations. 2. To provide a scientific basis for the reconstruction of crimes and accidents. 3. To develop and apply new techniques and technologies for the analysis of physical evidence. 4. To provide students with hands-on experience with forensic physics techniques and instrumentation
Course Outcomes:	Students will be able to– 1. Understand the fundamental principles of physics and their application to forensic science. 2. Knowledge of the types of physical evidence and their analysis, such as fingerprints, footprints, and tool marks. 3. Understanding of the principles of projectile motion and their application to forensic ballistics. 4. Knowledge of the physical properties of materials and their analysis, such as metals, plastics, and fabrics. 5. Understanding of the principles of thermodynamics and their application to fire and explosion investigations.

Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	• Fire Arms: History of firearms, Rifles, Revolver, Pistols, Actions of Firearms, Shotgun, Sub Machine Gun, Machine Gun, Improvised Firearms. • Ammunitions: Propellants, Primers, Primer Cap Types. Blank Ammunition, Tear Gas, Grenade Launcher, Dummy, Cartridge Cases - Rimless, Semi Rimmed, Rimmed, Belted. Bullets and Its Types, Components of Shotgun Ammunition.	8 Hrs.	8 Marks	• Interactive Lectures: Uses e • Multimedia presentations, interactive slides, and animations to illustrate complex concepts. • Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. • Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. • Explore virtual labs and simulations to enhance proper practical understanding. . • Flip-Class: • Assign readings or video lectures as home work
Unit II	• Internal Ballistics: Initiation, Combustion of Propellants, Density of Loading, Atmospheric Temperature, Shape of the Cartridge Case. Heat Problems, Barrel Pressure and Its Determination, Recoil, Measurement of Recoil, Barrel Fouling.	7 Hrs.	7 Marks	
Unit III	• Exterior Ballistics: Trajectory Formation, Vacuum Trajectories, Range, Experimental Determination and Shape of Trajectory, Spin, Drift, Angle of Fire, Structure of the Projectile, Sectional Density, Ballistic Coefficient, Influence of Earth and Escape Velocity • Air Resistance, Retardation, Wind Deflection, Firing Guns in the Air, Ricochet.	8 Hrs.	8 Marks	

Unit IV	• Terminal Ballistics: Introduction, Stopping Power of Bullet, Injuries and the Quantity of Energy of Projectiles, Shockwave and Cavitation Effect, Wounding Mechanism, • Elements of Wound Ballistics: Nature of Target, Velocity of Projectile, Constructional features of Projectile. Range; Classification of Range Contact Range, near range, range distant.	7 Hrs.	7 Marks	and use class time for • Interactive discussions and problem-solving. • Ask students to create concept maps that illustrate the relationships between different concepts in forensic science. • 7. Role playing:
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References	1. B.J. Heard, Handbook of Firearms and Ballistics, Wiley and Sons, Chichester (1997). 2. W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988). 3. A.J. Schwoeble and D.L. Exline, Current Methods in Forensic Gunshot Residue Analysis, CRC Press, Boca Raton (2000). 4. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000). 5. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). Web links 1. http://www.aafs.org/sections/physics-and-engineering-sciences 2. http://www.iafs.org/sections/physics-and-engineering 3. http://linkspringer.com 4. http://www.forensicsciencesimplified.org 5. http://dfsl.maharashtra.org.in
Model Questions:	Short Type 1) What is the difference between a rifle and a shotgun? 2) What is the purpose of a bullet's jacket? 3) What is the primary function of a firearm's trigger? 4) What is the curved path of a projectile called? 5) What is the term for the reduction in air resistance due to a projectile's shape? 6) What factors are evaluated during terminal ballistics testing? 7) What is the role of wound ballistics in forensic science? 8) What processes are involved in internal ballistics? 9) What are the applications of internal ballistics? 10) Where in internal ballistics used?

	Long Type 1. Discuss the importance of proper documentation and chain of custody in forensic ballistics examinations. How can failure to properly document and maintain chain of custody compromise the integrity of the examination and its results? 2. Describe the different types of firearms and their characteristics, including handguns, rifles, and shotguns. How do these characteristics affect the analysis of ballistic evidence? 3. Explain the process of conducting a gunshot residue (GSR) analysis, including the types of evidence that are analyzed and the methods used to detect and identify GSR. 4. Discuss the challenges and limitations of forensic ballistics examinations, including the potential for false positives and false negatives, and the limitations of ballistic evidence in reconstructing shooting incidents. 5. Describe the role of forensic ballistics in investigating crimes, including the types of crimes that are typically investigated using ballistic evidence, and the ways in which ballistic evidence is used to reconstruct crimes and identify suspects. 6. Explain the concept of "range estimation" in forensic ballistics, and describe the methods used to estimate the distance between a firearm and a target based on ballistic evidence. 7. Discuss the importance of collaboration and communication between forensic ballistics experts, investigators, and prosecutors in ensuring the effective use of ballistic evidence in criminal investigations and trials. 8. Describe the future directions of forensic ballistics, including the development of new technologies and methods for analyzing ballistic evidence, and the potential applications of these advancements in criminal investigations and national security. 9. Explain the process of conducting a ballistic trajectory analysis, including the types of evidence that are analyzed and the methods used to reconstruct the trajectory of a bullet. 10. Discuss the importance of proper training and certification for forensic ballistics experts, including the types of training and certification programs that are available, and the benefits of these programs in ensuring the quality and reliability of ballistic evidence
	MCQs for Internal Assessment 1. What is the primary goal of forensic ballistics? A) To identify the type of firearm used in a crime B) To determine the trajectory of a bullet C) To analyze the chemical composition of gunshot residue D) To reconstruct the events surrounding a shooting 2. Which of the following is a type of forensic ballistics analysis? A) Bullet comparison B) Cartridge case comparison C) Gunshot residue analysis D) All of the above 3. What is the term for the unique markings left on a bullet by a firearm? A) Striation marks B) Groove marks C) Lands and grooves D) Firing pin impressions 4. Which of the following is a common method used in forensic ballistics to compare bullets? A) Visual comparison B) Microscopic comparison C) Instrumental comparison D) All of the above 5. What is the term for the chemical residue left on a shooter's hands and clothing after firing a gun? A) Gunshot residue B) Firing pin residue C) Bullet residue D) Powder residue 6. Which of the following is a common type of gunshot residue analysis? A) Scanning electron microscopy (SEM) B) Energy-dispersive spectroscopy (EDS) C) X-ray fluorescence (XRF)

	D) All of the above 7. What is the term for the process of determining the distance between a firearm and a target based on the spread of gunshot residue? A) Range estimation B) Distance determination C) Gunshot residue analysis D) Trajectory analysis 8. Which of the following is a common challenge in forensic ballistics? A) Identifying the type of firearm used B) Determining the trajectory of a bullet C) Analyzing the chemical composition of gunshot residue D) Dealing with incomplete or damaged evidence 9. What is the term for the process of reconstructing the events surrounding a shooting based on ballistic evidence? A) Ballistic reconstruction B) Trajectory analysis C) Gunshot residue analysis D) Range estimation 10. Which of the following is a common application of forensic ballistics? A) Investigating homicides B) Analyzing gunshot wounds C) Reconstructing accidents C) All of the above
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Course Category: IKS in Forensic Science (Theory)Major
117213 IKS in Forensic Science

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117213	IKS in Forensic Science	2	30	2 Hrs.	30+20 =50

Course Objectives:	After studying this paper, the students will know - 1. To analyze the concept of crime and punishment in ancient India, focusing on the socio-cultural and legal frameworks. 2. To evaluate the systems of crime and justice in ancient India, including the roles of law and order. 3. To outline the establishment and evolution of forensic science institutions in post-independent India. 4. To recognize key contributors to forensic science globally and their impact on the field. 5. To analyze specific sections of the Indian Penal Code and the Indian Evidence Act relevant to crimes against persons and property.
Course Outcomes:	At the end of this course students will be able to: 1. Articulate the historical context of crime and punishment in ancient India. 2. Apply knowledge of ancient forensic techniques, such as fingerprinting, to modern contexts. 3. Students will outline the roles and contributions of key forensic science institutions established in post-independent India. 4. Identify and discuss the contributions of significant figures in the field of forensic science worldwide. 5. Demonstrate proficiency in the classification and essential elements of criminal law.

Unit System	Contents	Workload Allotted	Weightage Of Marks Allotted	Incorporation of Pedagogies
Unit I	Concept of Crime and Punishment in Ancient India: Poison and toxicology in Ancient India, Property and action of poison as per ancient literature, poisoning and its treatment in ancient India, Crime and Justice in Ancient India, Fingerprints in Ancient India, Crime Investigation in Ancient India vis-à-vis in contemporary western world.	7 Hrs.	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
Unit II	Forensic Science in the Post-Independent Era: Establishments of FSLs, Establishment of Institutions like BPR&D, NCRB, DFSS, NICFS, CDTI, CBI, NIA, Educational Institutes in Forensic Sciences, Development of Forensic Science in India vis-à-vis other countries, Contributors of forensic Science around the globe.	7 Hrs.	7 Marks	
Unit III	Law to Combat Crime 1: Classification civil, criminal cases. Essential elements of criminal law, Constitution and hierarchy of criminal courts, Criminal Procedure Code, Cognizable and non-cognizable offences, Bailable and non-bailable offences, Sentences which the court of Chief Judicial Magistrate may pass, Summary trials Section 260(2), Judgements in abridged forms Section 355, Expert witness. Cross examination and re-examination of witnesses.	8 Hrs.	8 Marks	
Unit IV	Law to Combat Crime 2: Indian Penal Code pertaining to offences against persons Sections 121A, 299, 300, 302, 304A: 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362, Sections 375 & 377 and their amendments, Indian Penal Code pertaining to offences against property Sections-378, 383, 293 in the code of criminal procedure.	7 Hrs	7 Marks	

References:	1. Saumitra Basu (2021), The History of Forensic Science in India, Routledge 2. Tewari RK, Ravikumar KV (2000), History and Development of Forensic Science in India 3. The Indian Penal Code: K.D. Gaur 4. The Criminal Procedure Code: Takwani 5. Criminology and Penology: N. V. Paranjape 6. The Law of Evidence: Batuklal Web links: 1. https://www.ncib.in/pdf/indian-penal-code.pdf 2. https://tinyurl.com/Toxic-Exposure-Laws 3. https://tinyurl.com/Ancient-Crime-Views 4. https://pmc.ncbi.nlm.nih.gov/articles/PMC7495674/ 5. https://bjs.ojp.gov/content/pub/pdf/wfbcjsin.pdf
Model Questions:	Short Type 1) Identify a key text that discusses poisons in Ancient India. 2) List one common mode of poisoning mentioned in ancient literature. 3) State a common treatment for poisoning in Ancient India. 4) Mention a method used for crime investigation in Ancient India. 5) Name an institution established post-independence for forensic science in India. 6) Classify offences as cognizable or non-cognizable. 7) Specify a section of the Indian Penal Code that addresses murder. 8) Indicate the purpose of Section 32 in the Indian Evidence Act. 9) Recognize a significant contributor to forensic science globally. 10) Define the term "bailable offence" in the context of Indian law.
	Long Type 1) Analyze the role of ancient Indian texts in documenting the properties and actions of various poisons, including specific examples and their implications for society. 2) Examine the different modes of poisoning as described in ancient Indian literature, focusing on the methods of administration and the cultural context surrounding these practices. 3) Discuss the treatment methods for poisoning in Ancient India, highlighting the contributions of traditional medicine and the effectiveness of these treatments based on historical evidence. 4) Evaluate the concepts of crime and justice in Ancient India, focusing on the legal frameworks, societal norms, and the philosophical underpinnings of punishment during that era. 5) Compare the use of fingerprints in crime investigation in Ancient India with contemporary forensic practices in the Western world, emphasizing advancements in technology and methodology. 6) Outline the establishment and functions of key forensic science institutions in post-independent India, such as the FSL, CBI, and NCRB, and their contributions to modern crime investigation. 7) Discuss the classification of civil and criminal cases in Indian law, including the essential elements that differentiate these categories and their implications for legal proceedings. 8) Examine the hierarchy of criminal courts in India, detailing the roles and responsibilities of each level within the judicial system and the significance of this structure in delivering justice. 9) Analyze the provisions of the Criminal Procedure Code regarding cognizable and non-cognizable offences, including the implications for law enforcement and the rights of the accused. 10) Evaluate the distinctions between bailable and non-bailable offences in Indian law, including the criteria for classification and the impact on the accused's rights.
	MCQs for Internal Assessment 1. Which ancient Indian text is known for discussing poisons and toxicology? a..Arthashastra b.Manusmriti c. Charaka Samhita d. Rigveda 2. What is the primary mode of poisoning mentioned in ancient Indian literature? a. Ingestion b. Injection c. Inhalation d. Absorption 3. Which treatment method was commonly used for poisoning in Ancient India? a. Bloodletting b. Herbal remedies c. Surgery d. Cauterization 4. What was the primary purpose of fingerprints in Ancient India? a. Identification b. Authentication of documents c. Artistic expression d. Medical diagnosis 5. Which institution was established in India post-independence to enhance forensic science? (d) a. CBI b. NCRB c. BPR&D d. All of the above 6. What type of offence is classified as cognizable? (b) a. Minor theft b. Murder c. Defamation d. Breach of contract 7. Which section of the Indian Penal Code deals with culpable homicide? (b) a. Section 299b. Section 300c. Section 302d. Section 304

	8. Which section of the Criminal Procedure Code pertains to summary trials? (a) a. Section 260b. Section 355c. Section 293d. Section 138 9. Which section of the Indian Evidence Act addresses the relevancy of statements made by a person who is dead? (a) a. Section 32b. Section 45c. Section 60d. Section 73 10. Which institution focuses on the development of forensic science education in India? (a) a. NICFS b. CBI c. DFSS d. All of the above
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117214 Forensic Physics Practical-Lab 06

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117214	Forensic Physics Practical-Lab 06	2	60	4 Hrs	25+25=50

Course Objectives:	The intended objectives are: 1. To apply the principles of physics to the analysis of evidence in criminal investigations. 2. To provide a scientific basis for the reconstruction of crimes and accidents. 3. To develop and apply new techniques and technologies for the analysis of physical evidence. 4. To provide students with hands-on experience with forensic physics techniques and instrumentation
Course Outcomes:	After completion of the practical students will know about: 1. Understand the fundamental principles of physics and their application to forensic science. 2. Knowledge of the types of physical evidence and their analysis, such as fingerprints, footprints, and tool marks. 3. Understanding of the principles of projectile motion and their application to forensic ballistics. 4. Knowledge of the physical properties of materials and their analysis, such as metals, plastics, and fabrics. 5. Understanding of the principles of thermodynamics and their application to fire and explosion investigations.
Unit System	Contents
Tutorial and Discussion	Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyzed using various methods.
Forensic Physics Practical	1. To prepare a report on evaluation of crime scene. 2. To compare different soil samples by microscopic method. 3. To compare different soil samples by chemical method. 4. To compare paint samples by physical matching method. 5. To compare paint samples by thin layer chromatography method. 6. To compare different glass samples. 7. To compare different glass fractures. 8. To compare different fiber samples. 9. To identify and compare tool marks. 10. To differentiate, with the aid of diagram, contact wounds, close range wounds and distant wounds. 11. To prepare a case report on cases relating to forensic physics.
References:	1. "Forensic Science Laboratory Manual" by Suzanne Bell (CRC Press, 2017) 2. "Practical Forensic Microscopy: A Laboratory Manual" by Barbara R. Wheeler (CRC Press, 2017) 3. "Forensic Analysis: A Practical Approach" by James M. Robertson (CRC Press, 2017) 4. "Forensic Science: An Introduction" by Stuart H. James and Jon J. Nordby (CRC Press, 2017) 5. "Practical Forensic Science: A Laboratory Manual" by Thomas A. Kubic and Nicholas D. K. Petraco (CRC Press, 2017) Weblinks 1. http://www.aafs.org/sections/physics-and-engineering-sciences 2. http://www.iafs.org/sections/physics-and-engineering 3. http://link.springer.com 4. http://www.forensicsciencesimplified.org 5. http://dfsl.maharashtra.org.in
Model Questions:	NA

Distribution of Marks and the scheme of Practical Examination is as follows:

Section1: Internal Assessment

• Active participation in activities	10Marks
• Continuous Assessment Tests(CAT)(At least three tests)*	10Marks
• Submission of duly certified practical record	05Marks
Total	25Marks

*Note: Total Performance in CAT (i.e.40%) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise1	10Marks
• Exercise2	10Marks
• Viva-Voce(external)	05Marks
Total	25Marks

Course Category: Minor (Theory)-7

117215 Forensic Physics and Ballistics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max. Marks
4.5	III	117215	Forensic Physics and Ballistics	2	30	2 Hrs	30+20 =50

Course Objective:	After studying this paper, the students will know – 1. To apply the principles of physics to the analysis of evidence in criminal investigations. 2. To provide a scientific basis for the reconstruction of crimes and accidents. 3. To develop and apply new techniques and technologies for the analysis of physical evidence. 4. To provide students with hands-on experience with forensic physics techniques and instrumentation						
Course Outcomes:	Students will be able to– 1. Understand the fundamental principles of physics and their application to forensic science. 2. Knowledge of the types of physical evidence and their analysis, such as fingerprints, footprints, and tool marks. 3. Understanding of the principles of projectile motion and their application to forensic ballistics. 4. Knowledge of the physical properties of materials and their analysis, such as metals, plastics, and fabrics. 5. Understanding of the principles of thermodynamics and their application to fire and explosion investigations.						
Unit System	Contents			Work load Allotted	Weight age of Marks Allotted	Incorporation of Pedagogies	
Unit I	❖ Trace Evidences Physical Properties of Materials: Composition, Temperature, Weight and Mass, Density, Refractive Index, Classification, Collection and Preservation and their Forensic Importance. (Glass, Soil, Fiber, Paint) ❖ Photography: Introduction, 35 Mm Film / Digital SLR Camera, Digital Photo Imaging, ISO Number, Exposure Index, Photo Imaging Evidence; Angle, Scale, Depth of Field, Light, Ambient Light, Colour Temperature, Flash/ Strobe, Photography of Footwear Impressions, Crime Scene Investigation Report Writing. Forensic Image Processing and Analysis.			7Hrs	7 Marks	1. Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. 3. Problem-Solving Sessions: Organize regular problem-solving Sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions and problem-solving. 6. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science.	
Unit II	• Fire Arms: History of firearms, Smooth Bore Firearms, Rifling, Revolver, Pistols, Actions of Firearms, Shotgun, Sub Machine Gun, Machine Gun, Improvised Firearms. • Ammunitions: Propellants- Black Powder, Smokeless Powders, Primers- Berdan Primer, Boxer Primer, Primer Cap Types - Rim Fire, Centre Fire, Pin Fire. Caseless, Blank Ammunition, Tear Gas, Grenade Launcher, Dummy, Cartridge Cases - Rimless, Semi Rimmed, Rimmed, Belted. Bullets and Its Types, Components of Shotgun Ammunition. • Internal Ballistics: Initiation, Combustion of Propellants, Density of Loading, Atmospheric Temperature,			8Hrs	8 Marks		

	Shape of the Cartridge Case. Heat Problems, Barrel Pressure and Its Determination, Recoil, Measurement of Recoil, Barrel Fouling.			7. Inquiry Based Learning: Explore topics through questioning, investigation, and research. 8. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. 9. Any other innovative pedagogy as applicable.
Unit III	• Exterior Ballistics: Trajectory Formation, Vacuum Trajectories, Range, Experimental Determination and Shape of Trajectory, Spin, Drift, Angle of Fire, Structure of the Projectile, Sectional Density, Ballistic Coefficient, Influence of Earth and Escape Velocity, Air Resistance, Retardation, Wind Deflection, Firing Guns in the Air, Ricochet. • Terminal Ballistics: Introduction, Stopping Power of Bullet, Injuries and the Quantity of Energy of Projectiles, Shockwave and Cavitation Effect, Wounding Mechanism, • Elements of Wound Ballistics: Nature of Target, Velocity of Projectile, Constructional features of Projectile. Range; Classification of Range Contact Range, Near Range, Distant Range, Penetration of Shots in Different Regions of the Body	8 Hrs	8 Marks	
Unit IV	❖ Tool Marks: • Marks Made by Hand Tools • Tools & Tool Marks Common Hand Tools ❖ Accidents • Vehicular Accidents: Primary Causes of Road Accident, Types of Road Accident, Sources of Information, Eye Witnesses, Tire and Other Marks, Pedestrian Impacts and Vehicle Speed and damage, Vehicle Condition, Types of Skid Marks, Curved Scuffmarks, Speed Estimation from Skid/Scuffmarks. Peripheral Vision of a Driver, Brake System and Steering Failure, Motor Vehicle Examination. • Rail Accidents: Investigation of Rail Crash: Criminal and Safety Investigation. Investigation Principles, Best Practices: Tests, Inspection of Driving Cab, Examination of Electrical/Electronic/Technological System and their Failure. Necessary Equipments Required for Forensic Examination.	7 Hrs	7 Marks	

References:	1. B.J. Heard, Handbook of Firearms and Ballistics, Wiley and Sons, Chichester (1997). 2. W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988). 3. A.J. Schwoeble and D.L. Exline, Current Methods in Forensic Gunshot Residue Analysis, CRC Press, Boca Raton (2000). 4. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000). Web links 1. http://www.aafs.org/sections/physics-and-engineering-sciences 2. http://www.iafs.org/sections/physics-and-engineering 3. http://linkspringer.com 4. http://www.forensicsciencesimplified.org 5. http://dfsl.maharashtra.org.in
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Model Questions:	Short Type 1) What is the primary goal of trace evidence analysis in forensic science? 2) What is the term for the process of analyzing soil to determine its origin? 3) Where are tool marks commonly found? 4) Which hand tool produces an impression mark? 5) What is the primary cause of vehicular accidents? 6) What is the difference between a rifle and a shotgun? 7) What is the purpose of a bullet’s jacket? 8) What is the primary function of a firearm’s trigger? 9) What is the curved path of a projectile called? 10) What is the term for the reduction in air resistance due to a projectile’s shape?
	Long Type 1. Discuss the importance of proper documentation and chain of custody in forensic ballistics examinations. How can failure to properly document and maintain chain of custody compromise the integrity of the examination and its results? 2. Describe the different types of firearms and their characteristics, including handguns, rifles, and shotguns. How do these characteristics affect the analysis of ballistic evidence? 3. Explain the process of conducting a gunshot residue (GSR) analysis, including the types of evidence that are analyzed and the methods used to detect and identify GSR. 4. Discuss the challenges and limitations of forensic ballistics examinations, including the potential for false positives and false negatives, and the limitations of ballistic evidence in reconstructing shooting incidents. 5. Describe the role of forensic ballistics in investigating crimes, including the types of crimes that are typically investigated using ballistic evidence, and the ways in which ballistic evidence is used to reconstruct crimes and identify suspects. 6. Explain the principles of paint analysis and describe the methods used to examine and compare paint samples found at crime scenes. Discuss the importance of paint analysis in forensic science and provide examples of how it has been used in real-life criminal investigations. 7. Explain the principles of analyzing and comparing footwear impressions and explain how it can be used to link a suspect to a crime scene. Discuss the different types of footwear impression analysis, such as size and shape comparison and tread pattern analysis, and provide examples of how footwear impression analysis has been used in real-life criminal investigations. 8. Describe the process of hair analysis and explain how it can be used to identify an individual or link a suspect to a crime scene. Discuss the different types of hair analysis, such as microscopic examination and DNA analysis, and provide examples of how hair analysis has been used in real-life criminal investigations. 9. Discuss the differences between various types of cameras, including DSLRs, mirrorless cameras, and point-and-shoot cameras. Explain the advantages and disadvantages of each type of camera and describe the situations in which each is best used. 10. Explain the concept of street photography and discuss the techniques used to capture candid images of people in public places. Describe the role of observation, anticipation, and timing in street photography.

	MCQs for Internal Assessment 1. What is the primary goal of forensic ballistics? A) To identify the type of firearm used in a crime B) To determine the trajectory of a bullet C) To analyze the chemical composition of gunshot residue D) To reconstruct the events surrounding a shooting 2. Which of the following is a type of forensic ballistics analysis? A) Bullet comparison B) Cartridge case comparison C) Gunshot residue analysis D) All of the above 3. What is the term for the unique markings left on a bullet by a firearm? A) Striation marks B) Groove marks C) Lands and grooves D) Firing pin impressions 4. Which of the following is a common method used in forensic ballistics to compare bullets? A) Visual comparison B) Microscopic comparison C) Instrumental comparison D) All of the above 5. What is the term for the chemical residue left on a shooter's hands and clothing after firing a gun? A) Gunshot residue B) Firing pin residue C) Bullet residue D) Powder residue 6. Which of the following is a common type of gunshot residue analysis? A) Scanning electron microscopy (SEM) B) Energy-dispersive spectroscopy (EDS) C) X-ray fluorescence (XRF) D) All of the above 7. What is the term for the process of determining the distance between a firearm and a target based on the spread of gunshot residue? A) Range estimation B) Distance determination C) Gunshot residue analysis D) Trajectory analysis 8. Which of the following is a common challenge in forensic ballistics? A) Identifying the type of firearm used B) Determining the trajectory of a bullet C) Analyzing the chemical composition of gunshot residue D) Dealing with incomplete or damaged evidence 9. What is the term for the process of reconstructing the events surrounding a shooting based on ballistic evidence? A) Ballistic reconstruction B) Trajectory analysis C) Gunshot residue analysis D) Range estimation 10. Which of the following is a common application of forensic ballistics? A) Investigating homicides B) Analyzing gunshot wounds C) Reconstructing accidents D) All of the above
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Course Category: Minor LAB-7

117216 Minor Forensic Physics Practical-Lab7

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117216	Minor Forensic Physics Practical-Lab7	2	60	4 Hrs	25+25=50
Course Objectives:		The intended objectives are: 1. To apply the principles of physics to the analysis of evidence in criminal investigations. 2. To provide a scientific basis for the reconstruction of crimes and accidents. 3. To develop and apply new techniques and technologies for the analysis of physical evidence. 4. To provide students with hands-on experience with forensic physics techniques and instrumentation					
Course Outcomes:		After completion of the practical students will know about: 1. Understand the fundamental principles of physics and their application to forensic science. 2. Knowledge of the types of physical evidence and their analysis, such as fingerprints, footprints, and tool marks. 3. Understanding of the principles of projectile motion and their application to forensic ballistics. 4. Knowledge of the physical properties of materials and their analysis, such as metals, plastics, and fabrics. 5. Understanding of the principles of thermodynamics and their application to fire and explosion investigations.					
Unit System		Contents					
Tutorial and Discussion		Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyzed during various methods.					
Basic skills in Forensic Physics Practical		1. To study structure and principles of Compound microscope. 2. To study structure and principles of Comparison microscope 3. To study structure and principles of Stereo microscope. 4. To physically examine different soil samples. 5. To examine different Trace evidences. 6. To prepare a case report on cases relating to forensic physics. 7. To compare different glass samples. 8. To compare different glass fractures. 9. To compare different fiber samples. 10. To examine paint samples.					
References:		1. "Forensic Science Laboratory Manual" by Suzanne Bell (CRC Press, 2017) 2. "Practical Forensic Microscopy: A Laboratory Manual" by Barbara R. Wheeler (CRC Press, 2017) 3. "Forensic Analysis: A Practical Approach" by James M. Robertson (CRC Press, 2017) 4. "Forensic Science: An Introduction" by Stuart H. James and Jon J. Nordby (CRC Press, 2017) 5. "Practical Forensic Science: A Laboratory Manual" by Thomas A. Kubic and Nicholas D. K. Petraco (CRC Press, 2017) Web links 1. http://www.aafs.org/sections/physics-and-engineering-sciences 2. http://www.iafs.org/sections/physics-and-engineering 3. http://link.springer.com 4. http://www.forensicsciencesimplified.org 5. http://dfsl.maharashtra.org.in					
Model Questions:		NA					

Distribution of Marks and the scheme of Practical Examination is as follows:

Section1: Internal Assessment

• Active participation in activities	10Marks
• Continuous Assessment Tests(CAT)(At least three tests)*	10Marks
• Submission of duly certified practical record	05Marks
Total	25Marks

*Note: Total Performance in CAT (i.e.40%) shall be based on the best two out of three in CAT examinations

Section2: External Assessment

• Exercise1	10Marks
• Exercise2	10Marks
• Viva-Voce(external)	05Marks
Total	25Marks

Course Category: GE/OE-3

117217 Forensic Science for Competitive Examinations

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117217	Forensic science for Competitive Examinations	2	30	2 Hrs	30+20=50

Course Objectives:	After studying this paper, the students will know – - The basic principles on which Forensic Science Works. - The working of the forensic establishments in India and abroad. - The importance of detecting frauds and forgeries by analyzing questioned documents. - The importance of examining questioned documents in crime cases. - The significance of comparing hand writing samples.			
Course Outcomes:	Students will be able to – - Understand the development, history, growth and scope of forensic science. - Understand the establishments of FSL and significance of blood stain spatter analysis. - Analyze the crime and crime scene management procedure. - Analyze the different methods of prints and impressions. - Determine the significance of document analysis in forensic science. - Explain the medico-legal importance of various crimes.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	INTRODUCTION TO FORENSIC SCIENCE Definition, History, Development and Scope of Forensic Science in India. Fundamental Principles of Forensic Science and its Significance, Organization and Functioning of State and Central Forensic Science Laboratories, (CFSL and RFSL) Ethics in Forensic Science. PHYSICAL EVIDENCES Definition, Types, Class and Individual Characteristics, Different Searching Methods for Locating Physical Evidences at Scene of Crime, Chain of Custody. FUNDAMENTAL OF POLICE: Historical Development of Police System in India. Police in Indian Constitution. Objective of Police, General organization of Police at State & Range Level. Police Organization under Central Government: General Information, Structure and Function of A. [1] BSF [2] Assam Rifles [3] CRPF [4] CISF [5] ITBP [6] NSG BPR & D [2] CBI [3] I.B [4] RAW [5] NCRB [6] NICFS [7] NPA [8] UT Police Force	8 Hrs.	8 Mark s	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-on Activity: Collection of allotropes of Carbon. Case Study: Find out harmful effects caused by drinking illegal liquor. Read the daily newspapers and make a report. Field Study: Survey minimum 10 household to find out which brand of washing powder people use in your neighborhood. To correlation relevance of theoretical knowledge with real world.
Unit II	CRIMESCENE Meaning, Types, Protection of Scene of Crime, Crime Scene Documentation-Note Taking, Videography, Photography and, Sketching Methods, Importance of Photography, General, Guidelines, Admissibility in Court, Various forms such as Videography.	7 Hrs.	07 Hrs.	Flip-Class: Assign readings or video lectures as homework and use class time for

	CRIME SCENE MANAGEMENT AND RECONSTRUCTION Elements of Crime Scene Management: - Information Management, Technology Management, Man-Power Management & Logistic Management. Introduction to Crime Scene Reconstruction, Nature of Reconstruction, Basic Principles for Physical Evidence and Reconstruction (Recognition, Identification, Individualization and Reconstruction), Stages in Reconstruction, Types of Reconstruction, Pattern Evidence in Reconstruction (Bloodstain Pattern Analysis for Reconstruction, Glass Fracture Patterns, Fire Burn Patterns, Tire and Skid Mark Patterns), Writing A Reconstruction Report. IPC (1860), Cr. P.C (1973) and IEA (1872)			interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Practical-Based Learning: Compare samples available in market. Analyze and discuss real cases to apply theoretical knowledge.
Unit III	GENERAL CHEMISTRY: Organic Chemistry- Structure and Bonding: Hybridization, Bond Length and Bond Angles, Bond Energy, Localized and Delocalized Chemical Bond. Structure and Characteristics of Alkane, Alkene, and Cyclo alkane, Alcohol, Phenol, Ethers, Aldehyde, Ketone, Carboxylic Acid, etc. Inorganic Chemistry- Trends in Periodic Table and Applications in Predicting and Explaining the Physical and Chemical Behaviors. Definitions of Acid and Base, Classification of Acids and Bases, Essential and Trace Elements in Biological Process, Metallo Porphyrins with Special Reference to Hemoglobin, Types of Magnetic Behaviors, Method of Determining Magnetic Susceptibility, Spin only Formula, L-S Coupling	8 Hrs		Any other innovative pedagogy as applicable.
Unit IV	BASIC PHYSICS Physical Properties: Temperature, Weight and Mass, Density, Refractive Index, Diffraction, Polarization. Laws of Motion- Motion in a Uniform Field, Centripetal Acceleration, Motion under a Central Force. Basic Optics: Light as an Electromagnetic wave, Interference of Light, Principle of Superposition, Two-Slit Interference, Michelson Interferometer and its Application. Microscopy: Numerical Aperture and Resolving Power of Microscopic Systems, How the Microscope Forms Images; Simple, Compound, Stereoscopic, Polarizing, Comparison, Fluorescence and Electron Microscopes.	7 Hrs		
References:	1. CHEMISTRY by Catherine E. Housecroft & Edwin C. Constabel, Pearson-Prentice Hall 2. Basic Training in Chemistry by Steven L. Hoenig, Kluwer Academic Publishers			

	3. Encyclopedia of Chemistry by Don Rittner & Ronald A. Bailey, Facts On File, Inc. 4. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001). 5. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001). 6. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982). Web resources: 1. https://youtu.be/okolv1y6lIE 2. https://youtu.be/cn_Vom--b4A 3. https://www.pbs.org/wgbh/nova/interactive/create-dna-fingerprint/ 4. https://www.public.asu.edu/~langland/forensics.html 5. https://www.thirteen.org/edonline/ntti/resources/lessons/ladder/
Model Questions:	Short Type (At least 6) 1. Define atomic size. 2. What is element? 3. What is the meaning of compound? 4. Which functional group is present in ethanol? 5. Write examples of acid and base. 6. Is forensic science significant in criminal investigations? 7. Is the chain of custody crucial for evidence integrity? 8. Does the Indian Constitution outline the role of police? 9. Are there specific qualities that define a good investigator? 10. Is witness interviewing a critical part of an investigation? 11. Can crime scenes be documented through various methods?
	Long Type (At least 4) 1. Draw the outline of the modern form of periodic table and indicate s,p,d and f-block in it. 2. What is atomic size? How it vary along periods and groups in periodic table? 3. Differentiate between metals and non-metals.. 4. Write any four types of organic compounds indicating functional group present in each? 5. What different chemical properties carbon compoundsshow? 6. Explain: Crystallization. 7. Differentiate between acids and bases. 8. Is the process of interviewing witnesses and interrogating suspects a fundamental aspect of gathering information in criminal investigations? 9. Is the management of crime scenes, including information and technology management, essential for ensuring a systematic approach to evidence collection and analysis? 10. Can the principles of crime scene reconstruction provide valuable insights into the sequence of events leading to a crime and assist in identifying suspects?
	MCQ (At least 8) 1. Modern periodic table is based on which property of elements? a) Atomic mass b) Atomic number c) Valency d) Density 2. The elements in a group of the periodic table have the same: a) Atomic number b) Number of neutrons c) Number of valence electrons d) Atomic size 3. What is the name of Group 18 elements in the periodic table? a) Alkali metals b) Alkaline earth metals c) Halogens d) Noble gases

	4. Which metal is liquid at room temperature? a) Iron b) Mercury c) Aluminium d) Lead 5.The investigator's qualities include: A) Indifference B) Attention to detail C) Lack of communication skills D) Impulsiveness 6.Crime scene documentation can include: A) Only written notes B) Videography and photography C) Verbal reports D) Public announcements 7.Bloodstain pattern analysis is used to: A) Determine the type of blood B) Understand the dynamics of a crime C) Identify the victim D) Analyze DNA 8.Fingerprints can be classified into: A) Only two types B) Three main patterns C) Four main patterns D) Five main patterns 9.The primary function of forensic document examination is to: A) Analyze financial statements B) Verify the authenticity of documents C) Conduct interviews D) Develop new writing instruments 10.The structure of DNA is primarily composed of: A) Amino acids B) Nucleotides C) Carbohydrates D) Proteins
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Course Category: VSC-LAB-8

117218 Forensic Physics Practical- Lab 8

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117218	Forensic Physics Practical- Lab 8	2	60	4 Hrs	25+25=50
Course Objectives:		The intended objectives are: 1. To apply the principles of physics to the analysis of evidence in criminal investigations. 2. To provide a scientific basis for the reconstruction of crimes and accidents. 3. To develop and apply new techniques and technologies for the analysis of physical evidence. 4. To provide students with hands-on experience with forensic physics techniques and instrumentation					
Course Outcomes:		After completion of the practical students will know about: 1. Understand the fundamental principles of physics and their application to forensic science. 2. Knowledge of the types of physical evidence and their analysis, such as fingerprints, footprints, and tool marks. 3. Understanding of the principles of projectile motion and their application to forensic ballistics. 4. Knowledge of the physical properties of materials and their analysis, such as metals, plastics, and fabrics. 5. Understanding of the principles of thermodynamics and their application to fire and explosion investigations.					
Unit System		Contents					
Tutorial and Discussion		Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyze during various methods.					
Forensic Physics Practical		1. To study different parts of Firearm. 2. To study different parts Ammunitions. 3. To study working and principles of compound microscope. 4. To study working and principles of comparison microscope 5. To study working and principles of stereo microscope. 6. To study various trace evidences 7. To prepare a case report in the context of forensic ballistics. 8. To study various advanced microscope. 9. To study working and principle of DSLR. 10. To study different types of bullets.					
References:		1. Forensic Science Laboratory Manual" by Suzanne Bell (CRC Press, 2017) 2. "Practical Forensic Microscopy: A Laboratory Manual" by Barbara R. Wheeler (CRC Press, 2017) 3. "Forensic Analysis: A Practical Approach" by James M. Robertson (CRC Press, 2017) 4. "Forensic Science: An Introduction" by Stuart H. James and Jon J. Nordby (CRC Press, 2017) 5. "Practical Forensic Science: A Laboratory Manual" by Thomas A. Kubic and Nicholas D. K. Petraco (CRC Press, 2017)					

	Web links 1. http://www.aafs.org/sections/physics-and-engineering-sciences 2. http://www.iafs.org/sections/physics-and-engineering 3. http://link.springer.com 4. http://www.forensicsciencesimplified.org 5. http://dfsl.maharashtra.org.in
Model Questions:	NA

Distribution of Marks and the scheme of (VSC) Practical Examination is as follows:

Section I: Continuous Internal Assessment	
• Continuous Assessment Tests (CAT) (At least three tests) *	15 Marks
• Submission of duly certified practical record	10 Marks
Total	25 Marks
Section II: End Semester Examination (Internal only)	
• Exercise 1	20 Marks
• Viva-Voce (internal)	05 Marks
Total	25 Marks
Total (Section I And II)	50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: FP/CEP (Project)-Lab9

117219 Forensic Science Practical-Lab 9 (FP/CEP in Forensic Science-I)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	III	117219	Forensic Science Practical-Lab 9 (FP/CEP in Forensic Science-I)	2	60	4 Hrs	25+25=50
Course Objectives:		The intended objectives are: • To develop an appreciation of logical reasoning. • To learn about the status of forensic investigative modification. • To understand the causes of crime and ring out the solution regarding the same. • To apply classroom knowledge of courses to field realities and thereby improvethe quality of learning.					
Course Outcomes:		Upon successful completion of this course, students will be able to: 1. Gain an understanding of implementation of forensic techniques in solving the crimes. 2. Develop skills to properly manage the implementation of particular processes. 3. Appreciate significant contributions of different forensic divisions in solving the crime. 4. Learn to value the local knowledge and wisdom of the community 5. Identify opportunities for contributing the betterment of humanity.					

Guidelines/ Sop for FP/CEP

For understanding key principles of CE, forms of CE, operational guidelines and implementation strategy please refer https://www.ugc.gov.in/pdfnews/4187860_Revised-Final-Guidelines.pdf

As per NEP 2020, students of B Sc. II of Semester III and IV need to perform a Field Project (FP) for TWO (2) credits i.e. 50 Marks. The guidelines regarding the field project are as follows:

1. The total time allocation for the student to carry out field project is 60 hours.
2. Students should participate in field-based projects under the supervision of faculty.
3. Assignment of project topics to individual students or groups of students (max 4 students in one group) and one faculty member from the department will act as Guide for the student or group of students.
4. For a SURVEY based project related questionnaire (15 or more questions) should be prepared.
5. The departmental coordinator/guide should check the questions and finalize the questionnaire. The question that may create unnecessary complications should be avoided. The questions should be qualitative as well as quantitative.
6. If the project is related to work that does not involve survey work, then the questionnaire part can be replaced accordingly (e.g. Sample collection/Data collection/ Experimental base etc).
7. The student should compile all the relevant data and carry out its analysis.
8. A project report should be written individually in the standard format (2 Copies): Index, Introduction, Materials, Methods, Result, Conclusion/output, References (Numeric citation type) etc.
9. The project report should be of minimum 6 pages (excluding Title page, Certificate, Index, Acknowledgement etc.). Submit the project report with the Guide's signature to the department.
10. The oral /poster presentation for all the projects should be arranged in the department. To evaluate the project, examiner should be appointed by HoD.
11. The total project work including preparation of questionnaire to presentation should be evaluated for 2 credits (50 Marks).

Some suggested forms of FP/ CEP are:

1. **Linking learning with community service:** For example, students of forensic science can conduct seminars to make people aware regarding the forensic implementation.
2. **Linking research with community knowledge:** Community-based Participatory Research (CBPR) approaches are gaining recognition in this regard. For example, students of forensic science can undertake research in partnership with the research laboratories.
3. **Knowledge sharing and knowledge mobilization:** These can take the forms of enumerations, surveys, awareness camps and campaigns, training, learning manuals/films, maps, study reports, public hearings, policy briefs, case studies and awareness teachings, legal aid clinics, etc. For example, students can undertake awareness programs for mothers and children, and educate them about self safety measures .
4. **Social innovations by students:** The students can be encouraged to initiate learning projects with a social impact and supported by HEIs. Incubation of such social innovation projects by students can also have meaningful links to existing curriculum and courses.

A few suggested (not exclusive) areas which not only provide practical applications of forensic science concepts but also foster collaboration, education, and sustainable practices within the community. are:

1. Understanding the implementation of forensic science techniques in solving the crime.
2. Enhance science literacy among school students through interactive demonstrations.

3. Managing public safety through awareness programs. 4. Explore various forensic methods and techniques for analyzing the evidences. 5. Identify and mitigate the crime rate y making people aware about the various upcoming crime. 6. Implement a community-wide initiative for the safety measures. 7. Introduce and demonstrate the principles of laws in the context of different crimes and making them aware of the rights they have. 8. Educate community members on the proper use and handling of evidences in the scene of crime. 9. Assist local people in understanding the rights and principles of laws for their betterment and safety.	
References	
Model Questions:	NA

Distribution of Marks and the scheme of FP/CEP Examination is as follows:

• Students’ performance	20 Marks
• Submission of duly certified FP/CEP report	20 Marks
• Presentation (PPT or Poster)	10 Marks
Total	50 Marks

Course Category: Major (Theory)-9

117220 Forensic Biology-1

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max. Marks
4.5	IV	117220	Forensic Biology-1	2	30	2 Hrs.	30 +20 =50

Course Objectives:	After studying this paper the students will know– 1. To identify and describe the various organelles within a cell. 2. The classification and characteristics of biomolecules. 3. The advancements in forensic biology. 4. The methods of human’s identification. 5. Learn the principles of protecting biological evidence at crime scenes.
Course Outcomes:	Students will be able to– 1. Explain cell structure and function. 2. Identify different body fluids. 3. Extract human DNA from biological samples. 4. Process the biological samples with biotechnology instruments. 5. Demonstrate effective techniques for protecting biological evidence.

Unit System	Contents	Workload Allotted	Weightage of Marks	Incorporation of Pedagogies
Unit I	A) Cell Biology - Cell structure, function - Cell organelle - Prokaryotic and eukaryotic cell B) Biomolecules - Estimation of Amino acids, proteins, nucleic acid carbohydrates, lipids - Enzymes	8 Hrs	8 Marks	1. Interactive Lectures: Use Multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. 3. Problem-Solving Sessions: Organize regular problem- solving sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. Flip-Class: Assign readings or video lectures as homework and use class time for Interactive discussions and problem-solving. 6. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science. 7. Role playing: Act out scenarios
Unit II	A) Forensic Serology - Forensic biology vs Forensic Serology - Blood Composition - Blood group typing-ABO, Rh, Mn B) Other body fluids - Saliva, Sweat, Semen, Vaginal	7 Hrs	7 Marks	
Unit III	A) Biological Evidences - Hair, bones, teeth, skin, fur, nails, horns B) Crime Scene Investigation - Protection of biological evidences - Documentation - Chain of custody - Recognition of biological evidences	8 Hrs	8 Marks	
Unit IV	A) Biotechnology of forensic importance - DNA Extraction methods - Southern, Northern and Western blotting - Basics of Polymerase Chain Reaction (PCR), Gel electrophoresis, Restriction Fragment Length Polymorphism (RFLP), Random Amplified Polymorphic DNA (RAPD), Single Nucleotide Polymorphism (SNP), Short tandem repeats (STRs) or	7 Hrs	7 Marks	

	microsatellites, Variable Number of Tandem Repeats (VNTR), Mitochondrial DNA, DNA chips,			
References	1. Forensic Biology–Richard Li 2. Forensic Biology by Shrikant H. Lade 3. Forensic Medicine–P.V. Guharaj & M.R. Chandran 4. Principles And Techniques of Biochemistry and Molecular Biology: Wilson and Walker 5. Fundamentals Of Forensic DNA Typing–John M. Butler 6. Scientific&LegalApplicationsOfBloodstainPatternInterpretation–StuartH.James 7. Forensic Science In Crime Investigation–Dr. Mrs. Rukmani Krishnamurthy 8. Forensic Science – An Introduction to Scientific and Investigative Techniques – Stuart H. James & Jon J. Nordby Weblinks 1. https://tinyurl.com/Cell-biology-Biomolecule 2. https://tinyurl.com/Forensic-Serology 3. https://tinyurl.com/BIOLOGICAL-EVIDENCE 4. https://tinyurl.com/DNA-extraction-methods 5. https://tinyurl.com/Place-of-Crime-investigation			
Model Questions:	Short Type 1) State the primary components of a nucleotide. 2) Mention two differences between DNA and RNA. 3) Summarize the role of the lysosome in cellular digestion. 4) Mention two common tests used to detect the presence of blood at a crime scene. 5) Summarize the importance of DNA analysis in conjunction with serological testing. 6) State the significance of the ABO blood group system in forensic investigations. 7) Elaborate on the methods used to differentiate between human and animal blood. 8) Classify the types of stains that can be analyzed in forensic serology. 9) Mention a type of biological sample that can be used for DNA analysis in forensics. 10) Describe the role of enzymes in the process of DNA extraction.			
	Long Type 1) State the various types of body fluids that can be encountered in forensic serology and discuss the significance of each in the context of forensic analysis. 2) Summarize the process of blood typing and its importance in forensic serology, including the role of ABO and Rh factor systems. 3) Mention the various types of biomolecules found in living organisms and classify them based on their structural and functional properties, providing specific examples for each category. 4) Summarize the process of DNA extraction from biological samples and its importance in forensic science. 5) State the ethical considerations involved in the collection and analysis of biological evidence. 6) Elaborate on the role of DNA profiling in forensic science, detailing the techniques used for DNA extraction, amplification, and analysis, and how these methods contribute to criminal investigations. 7) Summarize the process of polymerase chain reaction (PCR) and its significance in forensic investigations, particularly in cases where DNA samples are degraded or present in minimal quantities. 8) Classify the different types of biological evidence commonly encountered in forensic investigations, and describe the methods used to analyze each type of evidence. 9) Describe the procedure for collecting and preserving biological evidence from a crime scene, focusing on the protocols for handling body fluids.			

	10) State the methods used for the estimation of amino acids and proteins in biological samples, and discuss the importance of these biomolecules in cellular metabolism and function. 11) Elaborate on the differences between prokaryotic and eukaryotic cells, focusing on their structural components, organelles, and the implications of these differences for cellular function and complexity. 12) Summarize the process of protein synthesis in eukaryotic cells, detailing the roles of ribosomes, mRNA, tRNA, and the endoplasmic reticulum in this complex biological mechanism 13) Elaborate on the use of saliva as biological evidence and the methods for its detection and analysis. 14) State the significance of hair analysis in forensic investigations and the limitations associated with it. 15) Mention the advancements in technology that have improved the analysis of biological evidence in recent years.
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	MCQs for Internal Assessment 1. Luminol test is used as _____ test to detect blood. (A) a. Preliminary b. Confirmatory c. Both d. None 2. The phenolphthalein test is used for screening of the following: (C) a. Sweat b. Urine c. Blood d. All of the above 3. In which of the following type of cells the Gap junctions are absent? (a) a. Sperm cells b. Brain cells c. Reproductive cells d. Cardiac cells 4. Which of the following is known as powerhouse of the cell? (c) a. Cytoplasm b. Lysosome c. Mitochondria d. Nuclei 5. Most abundant RNA in the cell is __ (a) a. rRNA b. mRNA c. tRNA d. threonine 6. DNA is stored in which of the following cell organelle? (a) a. Nucleus b. Cytoplasm c. Cell membrane d. Cell wall 7. What type of biological evidence can be used for DNA profiling? (D) a. Bone b. Urine c. Semen d. All of the above 8. In which of the following an anticodon occurs _____. (b) a. mRNA b. tRNA c. rRNA d. DNA 9. Proteins are made up of _____. (c) a. Nucleic acid b. Nuclease c. Amino acid d. None of the above 10. Kastle Meyer test is presumptive _____ test that is used to detect Hb. (C) a. Sweat b. Saliva c. Blood d. Urine
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Course Category: Major (Theory)-10

117221 Forensic Biology -2

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117221	Forensic Biology -2	2	30	2 Hrs.	30 +20 =50

Course Objectives:	After studying this paper, the students will know– 1. The significance of anthropology and odontology in individualization. 2. To identify and classify biological agents into Categories A, B, and C. 3. Learn techniques for estimating the time of death using insect evidence. 4. Study methods for dating specimens using plant material. 5. Understand the importance of wildlife conservation and forensic science.
Course Outcomes:	Students will be able to– 1. Accurately estimate the age, sex, and ancestry of skeletal remains. 2. Classify biological agents based on their potential threat levels. 3. Estimate the post-mortem interval using entomological evidence. 4. Identify and classify plant specimens relevant to forensic cases. 5. Articulate the significance of wildlife protection in forensic contexts.

Unit System	Contents	Workload	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	A) Forensic Anthropology • Skeletal system and bone formation, • Determination of age, sex and race of humans from bones • Facial reconstruction B) Forensic Odontology • Development of dental structure • Estimation of age • Bitemark analysis	8 Hrs	8 Marks	1. Interactive Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Use digital modeling software for virtual three- dimensional visualization. 3. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. 6. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science. 7. Role playing: Act out scenarios.
Unit II	A) Forensic Microbiology • Types of biological agents - Category A, B, C • Bioterrorism, Bio surveillance and Biodefence • Punishment for bioterrorism act under Prevention Of Terrorism Act 2002	7 Hrs	7 Marks	
Unit III	A) Forensic Entomology • Basic principle of insect biology, Life cycle, Estimation of time of death, Preservation of sample Forensic Botany Identification of plant specimen, Techniques for dating specimen using plant material, Dendrochronology, Algal decolonization, Application of plant.	8 Hrs.	8 Marks	
Unit IV	A) Introduction to Wildlife Forensic Introduction and importance of wild life, Protected and endangered species of Animals and Plants. Wildlife Protection Act 1972	7 Hrs.	7 Marks	

References	1. Adams, B. J. (2007). <i>Forensic anthropology</i>. Chelsea House Pub. 2. Forensic Science In Wildlife Investigations. Adrian Linacre Taylor And Francis, 2009 3. The Wildlife Detectives: How Forensic Scientists Fight Crimes Against Nature By Donna M. Jackson, Wendy Shattil, Bob Rozinski Universal Athenaeum (Denver, Co, U.S.A.) 4. Forensic Entomology: The Utility Of Arthropods In Legal Investigations Jason H. Byrd, James L. Castner Taylor And Francis, 2009 5. Forensic Entomology: An Introduction By Dorothy E. Gennard Wiley. 6. Bryant, V.M. Jr, Mildenhall, D.C. And Jones, J.G., Forensic Palynology In The United States Of America Polynology. 1990, 14. Pp. 193-208 7. Forensic Palynology: An In-Depth Look At Its Indispensable Value National University, San Diego, 2002 8. Faegri, K. Iverson, J. And Krzywinski, K. Textbook Of Pollen Analysis 4th Edition. John Wiley & Sons, New York 1989. 9. Microbial Forensics By Roger Breeze, Bruce Budowle, Steven E. Schutzer. Elsevier Academic Press 10. The Forensic Laboratory Handbook Procedures And Practice By Ashraf Mozayani, Carla Noziglia. 2nd Edition. 2011. Human Press. Weblinks 1. https://tinyurl.com/Study-of-human-remains 2. https://tinyurl.com/Forensic-Microbiology 3. https://tinyurl.com/Study-of-insects 4. https://tinyurl.com/Plant-Forensics 5. https://tinyurl.com/Wildlife-Forensics
Model Questions:	Short Type 1) Define Forensic Anthropology. 2) Elaborate on the primary functions of the skeletal system in humans. 3) Summarize the primary goal of bioterrorism. 4) How can DNA analysis from teeth aid in victim identification? 5) State the primary skeletal features used to determine the sex of an individual. 6) State the ethical considerations involved in the use of insect evidence in forensic science. 7) State the primary purpose of forensic botany in criminal investigations. 8) Classify the different types of botanical evidence that can be collected at a crime scene. 9) Mention two methods used for collecting and preserving plant evidence. 10) Define Forensic entomology.
	Long Type 1) Mention the key morphological features used to determine the sex of human skeletal remains, and classify these features based on their reliability and the potential for misidentification. 2) Classify the various methods used to assess skeletal trauma in forensic anthropology, and describe how these assessments can provide insights into the cause and manner of death. 3) Describe the legal framework surrounding bioterrorism in India, particularly focusing on the Prevention of Terrorism Act (POTA) 2002. 4) Mention the major biological agents that fall under Category A and explain why they are considered the highest threat. 5) Elaborate on the significance of dental trauma in forensic investigations, including how the analysis of dental injuries can provide insights into the circumstances surrounding a crime or calamity. 6) State the limitations of bite mark analysis as a forensic tool, discussing the factors that can affect the accuracy and reliability of bite mark comparisons in legal contexts. 7) Mention the key features of human dentition that forensic odontologists examine when determining the identity of an individual, and classify these features based on their reliability and relevance in forensic investigations. 8) Elaborate on the role of forensic entomology in estimating the time of death in criminal investigations. 9) State the life cycle stages of common forensic insects and their relevance to entomological studies. 10) Summarize the process of collecting entomological evidence at a crime scene. 11) Summarize the methods used to analyze and interpret evidence in wildlife forensics. 12) Classify the different types of wildlife crimes and the forensic techniques used to investigate them. 13) Describe how forensic entomology can be applied in wildlife forensics to determine the time of death of animals. 14) Elaborate on the challenges faced by forensic entomologists when working in different geographical locations. 15) State the ethical considerations involved in the use of insect evidence in forensic science.

	MCQs for Internal Assessment 1) Wildlife Protection Act, 1972 was amended in which year? (c) a. 1999 b. 2000 c. 2002 d. 2012 2) Illegal way of trafficking animals is known as _____.(b) a. Kidnapping b. Poaching c. Harboring d. Smuggling 3) Poaching tiger is done for their _____. (a) a. Skin, bones b. Teeth, hair c. Bone, hair d. Skin, hair 4) What is the first insect to arrive at a decomposing body? (c) a. Beetles b. Ants c. Blowflies d. Moths 5) What is the term for the study of insect larvae? (a) a. Entomology b. Larval biology c. Myrmecology d. Dipterology 6) The total number of temporary molars in a child aged 7 years are _____. (d) a. 0 b. 4 c. 6 d. 8 7) Which type of teeth are not present in primary dentition? (b) a. Molar b. Premolar c. Canine d. Incisor 8) Which of the following is an example of a Category C biological agent? (C) a. Tularemia b. Smallpox c. Nipah virus d. Hantavirus 9) Anthropometry was started by _____. (b) a. Hans Gross b. Bertillon c. Galton d. Locard 10) Weight of dry skeleton in adult human male is : (b) a. 1.5 kg b. 4.5 kg c. 8 kg d. 12.5 kg
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Course Category: Major (Theory)-10
117229 Techniques in Forensic Biology -3

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117229	Techniques in Forensic Biology -3	2	30	2 Hrs.	30 +20 =50

Course Objectives:	After studying this paper, the students will know– - To provide knowledge of instrumental and analytical techniques for the study of biological evidence. - To develop expertise in nanotechnology and its applications in forensic science.
Course Outcomes:	Students will be able to– - Apply chromatographic (TLC, HPLC, GC) and spectroscopic (UV-Vis, IR, NMR) techniques in forensic biology. - Perform electrophoresis (Agarose, PAGE, and Isoenzyme) and blotting techniques for biomolecule analysis. - Demonstrate centrifugation methods for separation of nucleic acids, proteins, and cell components. - Characterize nanomaterials using microscopic and spectroscopic methods. - Explain physical, chemical, and biological methods of nanomaterial synthesis. - Evaluate applications of nanotechnology in forensic investigations including trace evidence analysis.

Unit System	Contents	Workload Allotted	Weightage of	Incorporation of Pedagogies
Unit I	Chromatography Principle, working, and applications of Planar chromatography (Paper Chromatography, TLC and HPTLC), Column Chromatography (HPLC and GC), Ion exchange Chromatography, Affinity Chromatography, Principle and applications of Hyphenated techniques (HPLC-MS, GC-MS) ●	8 Hrs.	8 Marks	1. Interactive Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 8. Hands-On Models: Use digital modeling software for virtual three-dimensional visualization. 9. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve doubts. 10. Explore virtual labs and simulations to enhance proper practical understanding. 11. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. 12. Ask students to create concept maps that illustrate the relationships between different concepts in forensic science. 13. Role playing: Act out scenarios.
Unit II	Spectroscopy Principle, working and applications of Ultra-violet and visible spectrophotometer, Infrared spectrophotometer Atomic absorption spectrometer Raman Spectrophotometer Fluorescence spectrophotometer	7 Hrs	7 Marks	
Unit III	Electrophoresis and Centrifugation General principles and applications of Agarose Gel Electrophoresis Polyacrylamide Gel Electrophoresis (Native-PAGE and SDS-PAGE) Capillary Electrophoresis; Iso-electric focusing (IEF) Blotting techniques: Southern Blotting; Northern Blotting; Western Blotting. General Principles of Centrifugation (Sedimentation velocity and sedimentation	8 Hrs	8 Marks	

Unit IV	DNA technique Structure of DNA, Damage to DNA, variation in DNA, DNA typing technique - RFLP, PCR, Amplification, PCR based typing methods such as HLA DQA1Amplify- type PM Poly markers, D 1580, STR, Gender ID, mt- DNA methods with their merits and demerits. Comparison of RFLP and PCR based method, Forensic Significance of DNA Profiling	7 Hrs.	7 Marks
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Reference s	1. Principles and Techniques of Biochemistry and Molecular Biology: Edt. Keith Wilson, John Walker 2. Biophysical chemistry Principles and techniques: Avinash Upadhyay, Kakoli Upadhyay and Nirmalendu Nath. 3. Instrumental Methods of Analysis6th Edition. (1986): H.H. Willard, L.L. Merritt Jr. and others.CBS Publishers and Distributors. 4. Instrumental Methods of Chemical Analysis. (1989): Chatwal G and Anand, S. Himalaya Publishing House, Mumbai. 5. A Biologists Guide to Principles and Techniques of Practical Biochemistry. (1975): Williams, B.L. and Wilson, K. 6. Spectroscopy. (Vol. 1): Edited by B.B. Straughan and S. Walker. Chapman and HallLtd. 7. Gel Electrophoresis of Proteins- A Practical Approach: Hanes. 8. Chromatography: Concepts and Contrasts- 1988 by James Miller. John Wiley and Sons. Inc., New York. 9. "Introduction to Biophysical Chemistry" by Prof. Sudhakar Banerjee and Prof. Rama Debata. 10. "Biophysical Chemistry: A Conceptual Approach" by Prof. Rajendra Nath and Prof. G.N. Saibaba. 11. "Biophysical Chemistry" by Prof. M.M. Chaturvedi and Dr. Surendra Kumar. 12. Analytical Biochemistry: Holme. 13. Introduction to High Performance Liquid Chromatography: R. J. Hamilton and P. A.Sewell. 14. Spectroscopy: B.P. Straughan and S. Walker. 15. Practical aspects of Gas Chromatography and Mass Spectrometry (1984) by Gordon M.Message, John Wiley and Sons, New York. 16. Gel Chromatography by Tibor Kremmery. 17. 17. Jaiprakash G. Shewale, Ray H. Liu Forensic DNA Analysis: Current Practices and Emerging Technologies, CRC Press. 18. 18. John M Butler: Forensic DNA Typing. Elsevier Academic Press. Weblinks 1. https://tinyurl.com/Study-of-human-remains 2. https://tinyurl.com/Forensic-Microbiology 3. https://tinyurl.com/Study-of-insects 4. https://tinyurl.com/Plant-Forensics 5. https://tinyurl.com/Wildlife-Forensics
Model Questions:	Short Type 11) Define Forensic Anthropology. 12) Elaborate on the primary functions of the skeletal system in humans. 13) Summarize the primary goal of bioterrorism. 14) How can DNA analysis from teeth aid in victim identification? 15) State the primary skeletal features used to determine the sex of an individual. 16) State the ethical considerations involved in the use of insect evidence in forensic science. 17) State the primary purpose of forensic botany in criminal investigations. 18) Classify the different types of botanical evidence that can be collected at a crime scene. 19) Mention two methods used for collecting and preserving plant evidence. 20) Define Forensic entomology.

	Long Type 16) Mention the key morphological features used to determine the sex of human skeletal remains, and classify these features based on their reliability and the potential for misidentification. 17) Classify the various methods used to assess skeletal trauma in forensic anthropology, and describe how these assessments can provide insights into the cause and manner of death. 18) Describe the legal framework surrounding bioterrorism in India, particularly focusing on the Prevention of Terrorism Act (POTA) 2002. 19) Mention the major biological agents that fall under Category A and explain why they are considered the highest threat. 20) Elaborate on the significance of dental trauma in forensic investigations, including how the analysis of dental injuries can provide insights into the circumstances surrounding a crime or calamity. 21) State the limitations of bite mark analysis as a forensic tool, discussing the factors that can affect the accuracy and reliability of bite mark comparisons in legal contexts. 22) Mention the key features of human dentition that forensic odontologists examine when determining the identity of an individual, and classify these features based on their reliability and relevance in forensic investigations. 23) Elaborate on the role of forensic entomology in estimating the time of death in criminal investigations. 24) State the life cycle stages of common forensic insects and their relevance to entomological studies. 25) Summarize the process of collecting entomological evidence at a crime scene. 26) Summarize the methods used to analyze and interpret evidence in wildlife forensics. 27) Classify the different types of wildlife crimes and the forensic techniques used to investigate them. 28) Describe how forensic entomology can be applied in wildlife forensics to determine the time of death of animals. 29) Elaborate on the challenges faced by forensic entomologists when working in different geographical locations. 30) State the ethical considerations involved in the use of insect evidence in forensic science.
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Course Category: Major LAB-10

117222 Forensic Biology Practical-Lab10

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117222	Forensic Biology Practical-Lab10	2	60	4 Hrs	25+25=50

Course Objectives:	The intended objectives are: 1. Learn to prepare protein samples for analysis. 2. Learn techniques for the quantitative analysis of lipids. 3. To introduce identification methods used in a forensic biology practical. 4. To learn techniques for determining age, sex, and race from skeletal remains. 5. Learn techniques for conducting presumptive and confirmatory tests for biological evidences.
Course Outcomes:	After completion of the practical students will know about: 1. To apply forensic anthropology techniques in real-world case studies. 2. To demonstrate knowledge of human skeletal anatomy and its variations. 3. To perform presumptive tests for blood in various samples. 4. Demonstrate proficiency in preparing and handling protein, carbohydrate and lipid samples. 5. Evaluate the impact of sample conditions on carbohydrate quantification.
Unit System	Contents
Tutorial and Discussion	Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyzed using various methods.
Basics of Forensic Science Practical	1. To determine the Blood group of an individual. 2. To estimate the age using dental characteristics. 3. Study the shape of pollens in the given sample. 4. Determination of sex from skull. 5. Determination of sex from pelvis. 6. To estimate the age using dental characteristics. 7. To study the life cycle of blowfly. 8. To examine different hair samples. 9. To perform confirmatory test for blood. 10. To perform presumptive test for blood. 11. To determine the presence of saliva stain in given sample. 12. To identify urine stains.
References:	1. Practical Skills In Forensic Science– Alan Langford, John Dean Et Al 2. Practical Crime Scene Analysis & Reconstruction – Roos M. Gardner & Tom Bevel 3. Forensic Science In Criminal Investigation And Trials – B.R. Sharma 4. Working Procedures Manual Forensic Biology 5. Scientific & Legal Applications Of Blood stain Pattern Interpretation – Stuart H. James 6. Forensic Science In Crime Investigation – Dr. Mrs. Rukmani Krishnamurthy
Model Questions:	NA

Distribution of Marks and the scheme of Practical Examination is as follows:

Section1: Internal Assessment

• Active participation in activities	10Marks
• Continuous Assessment Tests(CAT)(At least three tests)*	10Marks
• Submission of duly certified practical record	05Marks
Total	25Marks

*Note: Total Performance in CAT (i.e.40%) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise1	10Marks
• Exercise2	10Marks
• Viva-Voce(external)	05Marks
Total	25Marks

Course Category: Minor (Theory)

117223 Forensic Biology

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117223	Forensic Biology	2	30	2 Hrs	30+20 =50

Course Objective:	After studying this paper, the students will know– 1. Understand the fundamental structure and function of cells. 2. Understand the skeletal system and the processes of bone formation. 3. Explore the role of forensic odontology in legal contexts. 4. Explore methods for preserving insect samples for forensic analysis. 5. Explore the role of biological evidence in establishing identity and cause of death.						
Course Outcomes:	Students will be able to– 1. Apply knowledge of cell biology to real-world biological problems. 2. Demonstrate knowledge of human skeletal anatomy and its variations. 3. Identify and describe the stages of dental development. 4. Apply entomological principles to real-world forensic scenarios. 5. Explore the basics of Polymerase Chain Reaction (PCR) and its applications.						
Unit System	Contents	Work load Allotted	Weight age of Marks Allotted	Incorporation of Pedagogies			
Unit I	A) Cell Biology - Cell structure, function - Cell organelle - Prokaryotic and eukaryotic cell B) Biomolecules - Estimation of Amino acids, proteins, nucleic acid carbohydrates, lipids - Enzymes	8 Hrs	8 Marks	1. Interactive Lectures: Use multimedia presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Use digital modeling software for virtual three- dimensional visualization. 3. Problem-Solving Sessions: Organize regular problem-solving sessions where students can apply theoretic al knowledge to solve doubts. 4. Explore virtual labs and simulations to enhance proper practical understanding. 5. Flip- class: Assign readings or video lectures as homework and use class time for interactive discussions and problem-solving.			
Unit II	A) Forensic Anthropology - Skeletal system and bone formation - Determination of age, sex and race of humans from bones - Facial reconstruction B) Forensic Odontology - Development of dental structure - Estimation of age - Bitemark analysis	7 Hrs	7 Marks				
Unit III	A) Forensic Serology and Other body fluids - Forensic biology vs Forensic Serology - Blood Composition - Blood group typing-ABO, Rh, Mn - Saliva, Sweat, Semen, Vaginal fluid, Urine, Faeces C) Forensic Botany and Forensic Entomology - Identification of plant specimen, Dendrochronology, Algal colonization, Application of plant ecology, Study of spore and its forensic significance, Forensic palynology - Basic principle of insect biology, Life cycle, Estimation of time of death, Preservation of sample	8 Hrs	8 Marks				

Unit IV	A) Biotechnology of forensic importance • DNA Extraction methods • Southern, Northern and Western blotting • Basics of Polymerase Chain Reaction (PCR), Gel electrophoresis, Restriction Fragment Length Polymorphism (RFLP), Random Amplified Polymorphic DNA (RAPD), Single Nucleotide Polymorphism (SNP), Short tandem repeats (STRs) or microsatellites, Variable Number of Tandem Repeats (VNTR), Mitochondrial DNA, DNA chips, Forensic significance of DNA profiling-application in disputed paternity cases, child swapping	7 Hrs	7 Marks	
References:	1. Forensic Biology–Richard Li 2. Adams, B. J. (2007). <i>Forensic anthropology</i>. Chelsea House Pub. 3. Senn, D. R., & Weems, R. A. (2013). <i>Manual of Forensic Odontology</i>. CRC Press. 4. Forensic Entomology: An Introduction By Dorothy E. Gennard Wiley. 5. Faegri, K. Iverson, J. And Krzywinski, K. Textbook Of Pollen Analysis 4th Edition. John Wiley & Sons, New York 1989. 6. Fundamentals Of Forensic DNA Typing–John M. Butler 7. The Forensic Laboratory Handbook Procedures And Practice By Ashraf Mozayani, Carla Noziglia. 2nd Edition. 2011. Human Press. 8. Principles And Techniques Of Biochemistry And Molecular Biology: Wilson And Walker Web links:- 1. https://tinyurl.com/Cell-biology-Biomolecule 2. https://tinyurl.com/Study-of-human-remains 3. https://tinyurl.com/Forensic-Serology 4. https://tinyurl.com/Study-of-insects 5. https://tinyurl.com/DNA-extraction-methods			
Model Questions:	Short Type 1) Mention the limitations of serological testing in forensic science. 2) State the primary types of biological evidence commonly encountered at crime scenes. 3) Describe the significance of DNA in forensic investigations. 4) State the primary role of forensic entomology in criminal investigations. 5) Summarize the role of forensic entomology in cases involving buried bodies. 6) Define Wildlife forensics. 7) Describe the types of evidence commonly collected in wildlife forensic cases. 8) Mention the key features of the Golgi apparatus and its role in the cell. 9) Define forensic odontology. 10) What is the primary role of a forensic odontologist?			
	Long Type 1) Describe the role of dental anatomy in forensic odontology, detailing how the unique characteristics of teeth can aid in the identification of individuals and the determination of age, sex, and ancestry. 2) State the challenges forensic anthropologists face when working with fragmented or incomplete skeletal remains, and discuss the strategies they employ to reconstruct biological profiles in such cases. 3) Mention the role of forensic anthropology in mass disaster response and humanitarian efforts, and describe the methodologies used to identify victims and provide closure to families in such situations. 4) Elaborate on the role of forensic odontology in mass disaster scenarios, including how dental records are used to identify victims and the methodologies employed in such situations. 5) Classify the different types of carbohydrates based on their structure and complexity, and describe their functions in energy storage, structural support, and cellular recognition processes.			

	6) Elaborate on the impact of environmental factors on enzyme activity, providing examples of how temperature, pH, and substrate concentration can affect the rate of enzymatic reactions. 7) Classify the different types of bodily fluids that can be analyzed in forensic serology and elaborate on the specific tests used for each type. 8) Elaborate on the significance of saliva in forensic investigations, including the methods used for its detection and analysis. 9) Summarize the impact of forensic entomology on crime scene investigations, detailing how the study of insect life cycles can provide crucial information about the time of death and other aspects of a crime. 10) Classify the various types of forensic evidence that can be analyzed using biotechnology, such as fingerprints, bite marks, and trace evidence, and describe the techniques used to analyze each type. 11) Describe the role of forensic anthropology in the identification of human remains, including the application of biotechnological methods to determine age, sex, ancestry, and trauma. 12) Elaborate on the role of forensic botany in crime scene investigations and how plant evidence can be used to link suspects to a crime. 13) State the different types of plant materials that can be analyzed in forensic botany and their significance in forensic investigations. 14) Mention the methods used for collecting and preserving botanical evidence at a crime scene. 15) Classify the various types of plant evidence that can be relevant in forensic cases, such as pollen, seeds, and leaves.
	MCQs for Internal Assessment 1) Phenolphthalein test is used as ____ test to detect blood. (a) a. Preliminary b. Confirmatory c. Both d. None 2) Which of the following is a method for preserving biological evidence? (b) a. Storing in a plastic bag b. Freezing c. Drying out d. All of the above 3) The Wildlife Protection Act passed by the Parliament of India in _____. (d) a. 1975 b. 1974 c. 1973 d. 1972 4) Which of the following can be analyzed in forensic botany? (d) a. Pollen b. Seeds c. Wood d. All of the above 5) The study of insects in legal investigations is referred as _____. (b) a. Dendrochronology b. Entomology c. Chromatography d. Infectiology 6) Which of the following is a type of RNA involved in protein synthesis? (b) a. snRNA b. rRNA c. yRNA d. dsRNA 7) In a DNA structure, the Adenine always pairs with _____. (c) a. Cytosine b. Guanine c. Thymine d. Uracil 8) The term enzyme was coined by: (c) a. Miler b. Pasteur c. Kuhne d. Buchner 9) The term enzyme was coined by: (c) a. Miler b. Pasteur c. Kuhne d. Buchner 10) Complete closure of coronal suture at which age? (b) a. 30-40 yrs b. 40-50 yrs c. 50-60 yrs d. 60-70 yrs

Course Category: Minor LAB-11

117224 Minor Forensic Biology Practical-Lab11

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117224	Minor Forensic Biology Practical-Lab11	2	60	4 Hrs.	25+25=50

Course Objectives:	The intended objectives are: - To introduce identification methods used in a forensic biology practical. - To understand the importance of biological evidences. - To introduce identification methods used in a forensic biology practical. - To learn techniques for determining age, sex, and race from skeletal remains. - To learn techniques for conducting presumptive and confirmatory tests for biological evidences.
Course Outcomes:	After completion of the practical students will know about: - Students will accurately determine blood groups using laboratory methods. - Students will effectively estimate age based on dental characteristics. - Students will identify and analyze pollen shapes in forensic samples. - Students will successfully determine sex from skull and Pelvis features. - Students will examine human hair and identify key structural features.
Unit System	Contents
Tutorial and Discussion	Introductory knowledge about different microscopes and photography technique required in evidence collection. How different evidences are analyzed using various methods.
Basics of Forensic Science Practical	- To determine the Blood group of an individual. - To estimate the age using dental characteristics. - Study the shape of pollens in the given sample. - Determination of sex from skull. - Determination of sex from pelvis. - To estimate the age using dental characteristics. - To study the life cycle of blowfly. - To examine different hair samples. - To perform confirmatory test for blood. - To perform presumptive test for blood. - To determine the presence of saliva stain in given sample. - To identify urine stains.
References:	- Practical Skills In Forensic Science – Alan Langford, John Dean Et Al - Practical Crime Scene Analysis & Reconstruction – Roos M. Gardner & Tom Bevel - Forensic Science In Criminal Investigation And Trials – B.R. Sharma - Working Procedures Manual Forensic Biology - Scientific & Legal Applications Of Blood stain Pattern Interpretation–Stuart H. James - Forensic Science In Crime Investigation–Dr. Mrs. Rukmani Krishnamurthy
Model Questions:	NA

Distribution of Marks and the scheme of Practical Examination is as follows:

Section1: Internal Assessment

• Active participation in activities	10Marks
• Continuous Assessment Tests(CAT)(At least three tests)*	10Marks
• Submission of duly certified practical record	05Marks
Total	25Marks

*Note: Total Performance in CAT (i.e.40%) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise1	10Marks
• Exercise2	10Marks
• Viva-Voce(external)	05Marks
Total	25Marks

Course Category: Open Elective

117225 Advanced Techniques in Forensic Science

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117225	Advanced Techniques in Forensic Science	2	30	2 Hrs	30+20 =50

Course Objectives:	After studying this paper, the students will know- 1. Biomining processes and their applications in recovering valuable metals from waste. 2. Molecular diagnostic techniques such as ELISA and PCR for disease detection. 3. The use of monoclonal antibodies in cancer treatment and diagnostics. 4. Various staining techniques and their applications in microbiology. 5. The basics of forensic entomology and its application in death investigations.						
Course Outcomes:	After completion of the course, the learner will able to: 1. To assess the effectiveness of various biodegradation processes for environmental cleanup. 2. To apply DNA fingerprinting techniques to real-world forensic cases. 3. To evaluate the effectiveness of recombinant vaccines in preventing infectious diseases. 4. To apply staining techniques to visualize microorganisms under a microscope. 5. To collect and analyze entomological evidence to support forensic investigations.						
Unit System	Contents	Workload Allotted	Weightage Of Marks Allotted	Incorporation of Pedagogies			
Unit I	Environment: Application of biotechnology in environmental aspects: Degradation of organic pollutants – chlorinated and non-chlorinated compounds; degradation of hydrocarbons and agricultural wastes; Biodegradable plastics & Biofuels - production and its futuristic applications; Bioremediation, Biomining	7 Hrs	7 Marks	1. Presentations, interactive slides, and animations to illustrate complex concepts. 2. Hands-On Models: Making of models of dummy crime scenes. 3. Problem- Solving Sessions: Organize regular problem-solving sessions where students can apply theoretical knowledge to solve problems. 4. Explore forensic science laboratories and understanding working and organization of forensic chemistry and toxicology division 5. Flip-Class: Assign Readings or video lectures as homework and use class time for interactive discussions and problem solving. Ask students to create concept maps that illustrate the relationships between different concepts in forensic chemistry.			
Unit II	Forensic science: Application of biotechnology in forensic science: Solving crimes of murder and rape; solving claims of paternity and theft by using DNA finger printing techniques. Health: Application of biotechnology in health: Genetically engineered insulin, recombinant vaccines, gene therapy, molecular diagnostics using ELISA, PCR; monoclonal antibodies and their use in cancer; human genome project.	7 Hrs	7 Marks				
Unit III	Basics of microbiology: Concept of pure culture technique, stains and staining techniques, Control of Microorganisms: Physical & Chemical methods of control, microscopy principle and types of Microscopy, Broad classification of microorganisms. Immunity: Definition, types- natural, acquired, active, passive. Antigen-Definition, types of antigens, Factors influencing antigenicity; Antibody-Definition, structure, types, properties and functions of Immunoglobulin, Agglutination, Precipitation.	8 Hrs	8 Marks				
UNIT IV	Biological Evidence: Nature and importance of biological evidence. Composition and Functions of Blood and Semen. Types and identification	7 Hrs	7 Marks				

	of microbial organisms of forensic significance. Diatoms and their forensic significance Forensic Entomology: Basics of forensic entomology, Different Insects of forensic importance. Collection of entomological evidence during death investigations.			
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References:	1. Auteur: Erach Bharucha. (2005). Textbook of environmental studies : For undergraduate courses. Universities Press. 2. Principles And Techniques Of Biochemistry And Molecular Biology: Wilson And Walker 3. Stranford, S. A., Owen, J. A., Punt, J., Jones, P. P., & Kuby, J. (2023). Kuby Immunology: Covid-19 and Digital Update. Macmillan Learning. 4. Microbial Forensics By Roger Breeze, Bruce Budowle, Steven E. Schutzer. Elsevier Academic Press 5. Forensic Biology–Richard Li 6. The Forensic Laboratory Handbook Procedures And Practice By Ashraf Mozayani, Carla Noziglia. 2nd Edition. 2011. Human Press. 7. Byrd, J. H., & Tomberlin, J. (2020). Forensic entomology : the utility of arthropods in legal investigations. Crc Press, Taylor & Francis Group. Weblinks: https://egyankosh.ac.in/bitstream/123456789/95582/1/Block-1.pdf https://kahedu.edu.in/naac/C-3/Additional%20documents/E-content/1194.pdf https://tinyurl.com/Immune-and-Immunity https://tinyurl.com/Forensic-Microbiology https://www.ojp.gov/pdffiles1/Photocopy/116278NCJRS.pdf
Model Questions:	Short Type 1) Mention two methods used for the degradation of hydrocarbons. 2) Classify the types of biodegradable plastics based on their sources. 3) Mention two applications of DNA fingerprinting in forensic science. 4) Define PCR. 5) Classify the types of recombinant vaccines based on their composition. 6) State the main objectives of the Human Genome Project. 7) Mention the key steps involved in the pure culture technique. 8) Classify the types of biological evidence used in forensic investigations. 9) Elaborate on the significance of diatoms in forensic investigations. 10) Elaborate on the significance of insects in forensic investigations.
	Long Type 1) Summarize the production processes of biodegradable plastics. Discuss their environmental benefits compared to traditional plastics. 2) Describe the role of biotechnology in the development of sustainable agricultural practices. How can it help in waste management? 3) Describe the challenges faced in the application of biotechnology for environmental remediation. What future directions can be taken to overcome these challenges? 4) Classify the different types of biological evidence used in forensic investigations. Describe their significance in solving crimes. 5) Summarize the techniques used in the analysis of blood and semen in forensic investigations. What are the key factors that influence their identification? 6) Elaborate on the significance of diatoms in forensic investigations. How can they be used to determine the circumstances of death? 7) Classify the various molecular diagnostic techniques, including ELISA and PCR. Describe their applications in disease detection. 8) Elaborate on the immune system, including the definitions and types of immunity. Discuss the role of antibodies in immune responses. 9) Summarize the composition of blood and its significance in forensic investigations. How can blood evidence be used to link a suspect to a crime? 10) Classify the different components of semen and describe their functions. How is semen evidence collected and analyzed in forensic contexts? 11) Elaborate on the importance of microbial evidence in determining the time of death. How can microbial growth patterns assist forensic investigators? 12) Elaborate on the forensic significance of diatoms. How can diatom analysis contribute to determining the cause of death? 13) Elaborate on the basics of forensic entomology. What is its significance in death investigations? 14) Classify the various methods used to estimate the post-mortem interval (PMI) using entomological evidence. Discuss their reliability. 15) Describe PCR technique in detail.

	MCQs for Internal Assessment 1. The bioremediation technology which involves the addition of microbial culture is known as : (b) a. Bioremediation b. Bioaugmentation c. Bioventing d. Intrinsic Bioremediation 2. Biomass is useful to produce _____. (d) a. Chemicals b. Fibres c. Biochemicals d. Transportation fuels 3. Polymorphism arises due to _____. (a) a. Mutations b. Recombination c. Biploidy d. Haploidy 4. The PCR technique was developed by _____. (b) a. Kohler b. Kary Mullis c. Altman d. Milstein 5. How many types of antibodies are there? (c) a. Two b. Three c. Five d. Six 6. Phosphorus is essential component of _____. (d) a. Phospholipids b. Teichoic acid c. Nucleotides d. All of the mentioned 7. Which of the following option is not a type of ELISA? (c) a. Direct b. Sandwich c. Universal d. Multiplex 8. The _____ cannot be obtained by examining blood stain. (d) a. Race b. Sex c. Origin d. Cause of death 9. Forensic entomology can be applied to the cases of _____. (a) a. Litigation due to insect infestations b. Rape c. Neglect d. Homicide 10. The factor most determining in insect development is _____. (c) a. Light b. Humidity c. Temperature d. Pressure
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Course Category: Vocational Skill Course VSC Lab 12
117226 Hands on Techniques in Advanced Forensic Biology Lab 12

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117226	Hands on Techniques in Advanced Forensic Biology Lab 12	2	60	--	50

Course Objective s:	The intended objectives are: 1. To examine hair morphology to determine the species from which the hair originates. 2. To learn techniques to accurately determine blood groups from fresh blood samples. 3. To explore the life cycle of blowflies and their relevance in forensic entomology. 4. To combine various forensic methodologies for comprehensive biological evidence analysis. 5. To develop critical thinking skills to analyze and interpret forensic evidence effectively.	
Course Outcomes :	At the end of this course students will be able to: 1. To identify the species of hair samples based on morphological features. 2. To determine blood groups from fresh blood samples using forensic methods. 3. To exhibit proficiency in the proper handling and preservation of biological evidence. 4. To integrate multiple forensic techniques to analyze biological evidence comprehensively. 5. To apply critical thinking to evaluate and interpret forensic evidence in case studies.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	1. Introduction to knowledge about different examination techniques to analyze various samples. 2. Importance of evidence Analysis.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: • Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments.
Forensic Biology Practical	1. To examine hair morphology. 2. To differentiate between human and animal hair. 3. To design a checklist for the forensic scientists at the death scene. 4. To determine blood group from fresh blood samples. 5. Collection, Preservation and Handling of biological evidences commonly encountered in crime scene. 6. To study Confirmatory and presumptive test for blood samples. 7. To study different biomolecules. 8. Qualitative analysis of protein. 9. Qualitative analysis of sugar. 10. Qualitative analysis of lipids.	• Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding of forensic applications. • Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. • Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • Technology Integration: Incorporate proper tools and techniques for forensic analysis and presentation. • Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices. • Inquiry based Learning: Explore topics through questioning, investigation, and research. • Case based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.

References:	1. Standard practice for training in the forensic examination of hair by microscopy (2000). ASTM International. 2. https://tinyurl.com/Hair-examinationWorkingProceduresManualForensicBiology 3. The Forensic Laboratory Handbook Procedures And Practice By Ashraf Mozayani, Carla Noziglia.2nd Edition. 2011. Human Press. 4. Haematology, Practical Human Anatomy And Physiology, S.R. Kale et al., Nirali Prakashan, Eight Edition, 2002. 5. Tsutsumi, H. et al. (1991) ‘Identification of human urine stains on cloth’, International Journal of Legal Medicine. 6. Vyas, B., Halámková, L. and Lednev, I.K. (2020) ‘A universal test for the forensic identification of all main body fluids including urine’, Forensic Chemistry. Web resource: 1. https://tinyurl.com/Hair-analysis-in-Forensic 2. https://tinyurl.com/Forensic-Serology 3. https://tinyurl.com/Blood-group-examination 4. https://tinyurl.com/Analysis-of-Bodily-Fluids 5. https://tinyurl.com/anthropological-techniques
Model Questions:	NA

Distribution of Marks and the scheme of (VSC) Practical Examination is as follows:

Section I: Continuous Internal Assessment

- Continuous Assessment Tests (CAT) (At least three tests) * 15 Marks
 - Submission of duly certified practical record 10 Marks
- Total 25 Marks**

Section II: End Semester Examination (Internal only)

- Exercise 1 20 Marks
- Viva-Voce (internal) 05 Marks

Total 25 Marks

Total (Section I And II) 50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Skill Enhancement Course SEC-2

117227 Forensic Biology Lab 13

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117227	Forensic Biology Lab 13	2	60	04 Hrs.	50

Course Objectives :	The intended objectives are: - To gain knowledge of basic laboratory equipment and apparatus, including glassware and instruments used in forensic biology. - Learn to prepare various staining reagents essential for forensic biological analysis. - To promote good laboratory practices to maintain a safe and efficient working environment. - To implement quality control measures to ensure the accuracy and reliability of laboratory results. - To identify and manage hazardous materials commonly encountered in forensic biology labs.	
Course Outcomes:	After completion of the course, the learner will able to: - Implement general safety guidelines and identify potential hazards in a forensic biology laboratory, ensuring a safe working environment for oneself and others. - Explain the basic concepts of laboratory equipment and apparatus used in forensic biology, including glassware and common laboratory instruments, and their appropriate usage. - Prepare different types of solutions, including molar normal formal and molal solutions, and determine their concentrations accurately using appropriate techniques. - Perform pH measurements of solutions used in forensic biology, interpret the results, and understand the implications of pH in various forensic applications. - Implement quality control measures to ensure the reliability and accuracy of forensic laboratory results.	
Unit System	Content/Experiments	Incorporation of Pedagogies
Forensic Biology Lab 13 Practical	- To study the structure of Prokaryotic cell. - To study the structure of eukaryotic cell. - General guidelines for safety in a forensic biology laboratory, possible laboratory hazards. - To study various biological fluids. - General concept of basic equipment and apparatus (Glassware and laboratory instruments). - Determination of pH of solutions used in forensic biology. - Preparation of various staining reagents used in forensic biology. - Preparation of temporary slides. - Sterilization of glassware and basal media. - Preparation of biological solutions using molality, normality and formality. - To study the skeletal system of human body.	By combining hands-on experiments, discussions and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding of forensic applications. Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. Technology Integration: Incorporate proper tools and techniques for forensic analysis and presentation. Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices. Inquiry based Learning: Explore topics through questioning, investigation and research Case based Learning: Analyze and Discuss real cases to apply theoretical knowledge Any other innovative pedagogy as applicable

References:	1. Practical Skills In Forensic Science–Alan Langford, John Dean Et. Al. 2. Practical Crime Scene Analysis & Reconstruction – Roos M. Gardner & Tom Bevel Forensic Science In Criminal Investigation And Trials – B.R. Sharma 3. Working Procedures Manual Forensic Biology 4. Scientific&LegalApplicationsOfBloodstainPatternInterpretation–StuartH.James 5. Forensic Science In Crime Investigation– Dr. Mrs. Rukmani Krishnamurthy Web resource: 1. https://tinyurl.com/Basic-Laboratory-Equipment 2. https://tinyurl.com/pH-Determination 3. https://tinyurl.com/stains-preparation 4. https://tinyurl.com/Preparation-of-solutions 5. https://tinyurl.com/Sterilization-of-Glassware
Model Questions:	NA

Distribution of Marks and the scheme of (SEC) Practical Examination is as follows:

Section I: Continuous Internal Assessment	
• Continuous Assessment Tests (CAT) (At least three tests) *	15 Marks
• Submission of duly certified practical record	10 Marks
Total	25 Marks
Section II: End Semester Examination (Internal only)	
• Exercise 1	20 Marks
• Viva-Voce (internal)	05 Marks
Total	25 Marks
Total (Section I And II)	50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: FP/CES(Project)-Lab14

117228 Forensic Science -Lab 14 (FP/CEP in Forensic science-II)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	IV	117228	Forensic Science -Lab 14 (FP/CEP in Forensic science-II)	2	60	4 Hrs	25+25=50
Course Objectives:		The intended objectives are: • To develop an appreciation of logical reasoning. • To learn about the status of forensic investigative modification. • To understand the causes of crime and ring out the solution regarding the same. • To apply classroom knowledge of courses to field realities and thereby improve the quality of learning.					
Course Outcomes:		Upon successful completion of this course, students will be able to: 1. Gain an understanding of implementation of forensic techniques in solving the crimes. 2. Develop skills to properly manage the implementation of particular processes. 3. Appreciate significant contributions of different forensic divisions in solving the crime. 4. Learn to value the local knowledge and wisdom of the community 5. Identify opportunities for contributing the betterment of humanity.					
Guidelines/ SoP for FP/CEP For understanding key principles of CE, forms of CE, operational guidelines and implementation strategy please refer https://www.ugc.gov.in/pdfnews/4187860_Revised-Final-Guidelines.pdf As per NEP 2020, students of B Sc. II of Semester III and IV need to perform a Field Project (FP) for TWO (2) credits i.e. 50 Marks. The guidelines regarding the field project are as follows: 1. The total time allocation for the student to carry out field project is 60 hours. 2. Students should participate in field-based projects under the supervision of faculty. 3. Assignment of project topics to individual students or groups of students (max 4 students in one group) and one faculty member from the department will act as Guide for the student or group of students. 4. For a SURVEY based project related questionnaire (15 or more questions) should be prepared. 5. The departmental coordinator/guide should check the questions and finalize the questionnaire. The question that may create unnecessary complications should be avoided. The questions should be qualitative as well as quantitative. 6. If the project is related to work that does not involve survey work, then the questionnaire part can be replaced accordingly (e.g. Sample collection/Data collection/ Experimental base etc). 7. The student should compile all the relevant data and carry out its analysis. 8. A project report should be written individually in the standard format (2 Copies): Index, Introduction, Materials, Methods, Result, Conclusion/output, References (Numeric citation type) etc. 9. The project report should be of minimum 6 pages (excluding Title page, Certificate, Index, Acknowledgement etc.). Submit the project report with the Guide's signature to the department. 10. The oral /poster presentation for all the projects should be arranged in the department. To evaluate the project, examiner should be appointed by HoD. 11. The total project work including preparation of questionnaire to presentation should be evaluated for 2 credits (50 Marks). Some suggested forms of FP/ CEP are: 1. Linking learning with community service: For example, students of forensic science can conduct seminars to make people aware regarding the forensic implementation. 2. Linking research with community knowledge: Community-based Participatory Research (CBPR) approaches are gaining recognition in this regard. For example, students of forensic science can undertake research in partnership with the research laboratories. 3. Knowledge sharing and knowledge mobilization: These can take the forms of enumerations, surveys, awareness camps and campaigns, training, learning manuals/films, maps, study reports, public hearings, policy briefs, case studies and awareness teachings, legal aid clinics, etc. For example, students can undertake awareness programs for mothers and children, and educate them about self safety measures . 4. Social innovations by students: The students can be encouraged to initiate learning projects with a social impact and supported by HEIs. Incubation of such social innovation projects by students can also have meaningful links to existing curriculum and courses. A few suggested (not exclusive) areas which not only provide practical applications of forensic science concepts but also foster collaboration, education, and sustainable practices within the community are:							

1. Understanding the implementation of forensic science technique in solving the crime. 2. Enhance science literacy among school students through interactive demonstrations. 3. Managing public safety through awareness programs. 4. Explore various forensic methods and techniques for analyzing the evidences. 5. Identify and mitigate the crime rate y making people aware about the various upcoming crime. 6. Implement a community-wide initiative for the safety measures. 7. Introduce and demonstrate the principles of laws in the context of different crimes and making them aware of the rights they have. 8. Educate community members on the proper use and handling of evidences in the scene of crime. 9. Assist local people in understanding the rights and principles of laws for their betterment and safety..	
References	
Model Questions:	NA

Distribution of Marks and the scheme of FP/CEP Examination is as follows:

- Students’ performance

20 Marks

• Submission of duly certified FP/CEP report

20 Marks

• Presentation (PPT or Poster)

10 Marks

Total50 Mark

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI



Degree of Bachelor of Science
FORENSIC SCIENCE
Semester V and VI

FACULTY: SCIENCE AND TECHNOLOGY

(Courses effective from Academic Year 2026-27)
Under NEP 2020 (As per Uniform NEP Scheme)

SYLLABUS

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TLE Scheme for THIRD YEAR: SEMESTER – V (Level 5.5)

Level	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical Marks				Theory/Pract (Total) Marks	
						External		Internal			
						Max.	Min.	Max.	Min.	Max.	Min.
5.5	Major-T	117230	Forensic Psychology	2	2	30	9	20	6	50	20
5.5	Major-T	117231	Forensic Medicine	2	2	30	9	20	6	50	20
5.5	Major-T	117232	Environmental & Wildlife Forensics	2	2	30	9	20	6	50	20
5.5	Major-P	117233	Forensic Psychology Lab 15	2	4	25	10	25	10	50	20
5.5	Major-Elective T1	117234	Disaster Victim Identification and Imaging Techniques	2	2	30	9	20	6	50	20
5.5	Major-Elective P1	117235	DVIIT Practical Lab 16 A	2	4	25	10	25	10	50	20
OR											
5.5	Major-Elective T2	117236	Criminal Profiling and Behavioral Analysis	2	2	30	9	20	6	50	20
5.5	Major-Elective P2	117237	Criminal Profiling and Behavioral Analysis Lab 16 B	2	4	25	10	25	10	50	20
5.5	Minor-T	117238	Forensic Psychology-3	2	2	30	9	20	6	50	20
5.5	Minor-P	117239	Forensic Psychology Lab 17	2	4	25	10	25	10	50	20
5.5	VSC-P	117240	Forensic Instrumentation Lab -18	2	4	-	-	50	20	50	20
5.5	SEC-P	117241	Forensic Photography Lab 19	2	4	-	-	50	20	50	20
5.5	FP/CEP	117242	(FP/CEP in Forensic Science - III) Forensic Science Lab 20	2	4	-	-	50	20	50	20
5.5	Non Credit		Foundation of Artificial Intelligence	NC	2			30+20	9+6	50	20

Important:

- **VSC Should be Complementary to Major**
- **SEC must be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor**
- As per Sant Gadge Baba Amravati University, Amravati Extra-Ordinary Notification No. No. 241/2025 Dated 24/12/2025 “Foundation of Artificial Intelligence” is the mandatory **Non Credit Course** compulsory course for all the UG students in fifth semester of all undergraduate programs of all faculties in Sant Gadge Baba Amravati University, Amravati to earn their degree
- NC is Non Credit Course
- Students must select **Any One** of the Major-Elective Courses (T1 to T2) with respective Practical Course in Semester V.

TLE Scheme for THIRD YEAR: SEMESTER – VI (Level 5.5)

Level	The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical Marks				Theory/Pract (Total) Marks	
						External		Internal			
						Max.	Min.	Max.	Min.	Max.	Min.
5.5	Major-T	117243	Basics of ICT	2	2	30	9	20	6	50	20
5.5	Major-T	117244	Digital and Cyber Forensics	2	2	30	9	20	6	50	20
5.5	Major-T	117245	Fundamentals of Forensic ICT	2	2	30	9	20	6	50	20
5.5	Major-P	117246	Cyber and ICT Forensics Lab 21	2	4	25	10	25	10	50	20
5.5	Major-Elective T1	117247	Forensic Accounting and Auditing	2	2	30	9	20	6	50	20
5.5	Major-Elective P1	117248	Forensic Accounting Lab 22 A	2	4	25	10	25	10	50	20
OR											
5.5	Major-Elective T2	117249	Forensic Fraud Investigation	2	2	30	9	20	6	50	20
5.5	Major-Elective P2	117250	FRS Lab 22 B	2	4	25	10	25	10	50	20
5.5	Minor-T	117251	Digital and Cyber Forensics	2	2	30	9	20	6	50	20
5.5	Minor-P	117252	Digital and Cyber Forensics Lab 23	2	4	25	10	25	10	50	20
5.5	VSC-P	117253	FRS Lab 24	2	4	-	-	50	20	50	20
5.5	Intern/Apprenticeship	117254	FRS Lab 25 Internship /Apprenticeship/ OJT	4	8	-	-	50	20	50	20

Important:

- VSC Should be Complementary to Major has to be selected from the Basket Provided by University, from the same Faculty/Discipline of the Major/Minor
- **Students** must select **Any One** of the Major-Elective Courses (T1 to T2) with respective Practical Course in Semester VI.

Examination and Assessment Process:

- i. The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- ii. Exit options are provided with Certificate, Diploma and Basic Bachelor’s degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor’s degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- iii. For the smooth success of four-year degree programme with multiple entry and exit systems, the examination mode should be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit) examination modes in line with the UGC Report on ‘Evaluation Reforms in Higher Educational Institutions (2019).

Examination, Evaluation and Assessment Scheme

The total marks for each Course shall be based on Continuous Assessment and Semester End Examination. Each theory course of Major, Minor, GE/OE, AEC, IKS, VEC as mentioned in **Teaching Learning Scheme** prepared by the Board of Studies shall be evaluated as per the scheme as mentioned in the following table

Examination, Evaluation and Assessment Scheme

Vertical No.	The Vertical	Mode of Examination, Evaluation & Assessment	Theory				Theory (Total)		Practical				Practical (Total)	
			External		Internal				External		Internal			
			Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
A	Major	External & Internal	30	9	20	6	50	20	25	10	25	10	50	20
B	Minor		30	9	20	6	50	20	25	10	25	10	50	20
C	Generic/ Open Elective		30	9	20	6	50	20	--	--	--		--	--
D	VSC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	SEC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
E	AEC (Eng. & One MIL Composite)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	IKS (Generic)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	VEC	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
F	FP/CEP	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	Internship/ Apprenticeship		Assessment of these verticals shall be based on various activities/practices. It shall be evaluated by giving maximum marks of 50 per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process is prescribed for Phase I and Phase II											
	CC													

Continuous Assessment Tests (CAT)

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under-

- i. Three CAT each of 8 / 10 Marks (Theory) as applicable and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days.
- ii. Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- iii. Total Performance in CAT (i.e. 40 %) shall be based on the **best two out of three** in CAT examinations
- iv. Internal assessment shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, record book, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

Conduction of the Examination:

As per the scheme of teaching, learning, examination and evaluation, theory/practical examinations of Semester-I, II, III, IV, V, VI, VII and VIII shall be conducted by the University (except for Internal Examinations as applicable) at the end of each semester.

The theory/practical examinations of all the Semesters shall be held as per the following Schedule –

Sr. No.	Name of the Examination	End Sem Examination	Supplementary Examination*
1	Semester-I, III, V and VII	Winter	Summer
2	Semester-II, IV, VI and VIII	Summer	Winter

* The University may evolve mechanism for conducting repeat end semester examination. Such repeat examinations shall have to be conducted within one month of the regular even semester examination and on demand examination.

1. The practical examination of all semesters shall be conducted by the University at the end of each semester. The HEI shall conduct the Practical examination of odd semesters as per the schedule announced by the University. **However, the appointment of the External and Internal Examiners shall be done by the Head or Principal of respective HEI to conduct external examination of the odd semester and the same should be communicated to the University before commencement of the practical examination.** The University shall conduct the external practical examination of all even semester by appointing external and internal examiners.
2. The examinations specified above shall be held twice in a year at such places and on such dates as may be prescribed by the University.
3. An applicant to an examination specified above, shall pursue a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College/Institute/University department.
4. Provided that the student shall be eligible to appear for examination if -
 - a. He/she complies with the provisions of the Ordinance pertaining to the Examination in general from time to time.
 - b. He/she has prosecuted a regular course of study in a university department/college affiliated to the University.
 - c. He/she has in the opinion of the principal shown satisfactory progress in his/her studies.
5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be *mutatis-mutandis* applicable to every collegiate/non-collegiate student.
6. The fees for each theory examination and practical examination conducted by the university shall be as prescribed by the University, from time to time.

Course Category: **Major (Theory)**
117230 Forensic Psychology

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117230	Forensic Psychology	2	30	2 Hrs.	30+20=50

Course Objectives:	- Students will learn Fundamentals of forensic psychology and functional issues of forensic psychology. - To make the students proficient in psychological principles and their methods of formulations, preparing them for advanced studies in forensic psychology. - To equip the students with a comprehensive understanding of Role of forensic psychologist, enabling them to apply theoretical concepts and experimental techniques to real-world of psychological theories.
Course Outcomes:	After successful completion of the course, a student will be able to- - To understand the nature and scope of forensic psychology; - Describe the sub-specialities in forensic psychology. - Explain the ethical issues in forensic psychology. - Describe the roles and functions of a forensic psychologist; and discuss the qualification and training of forensic psychologist - Assessing mental states, understanding criminal behaviour, and navigating courtroom procedures - Expert Testimony: Learning how to write formal expert witness reports and present psychological findings clearly and objectively in court. - Judicial Reasoning: Understanding the intersection of psychology and criminal law, including how to avoid expert bias and navigate courtroom procedures - Criminal Profiling: Analysing patterns of human behaviour, motives, and intent in criminal investigations. - Victim Assistance: Developing frameworks to provide psychological support to victims of crime. - Identifying and resolving ethical dilemmas unique to forensic settings, such as dual-relationship conflicts

Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Forensic Psychology Definition, scope, and importance of forensic psychology. History and development (India & global perspective) Role of forensic psychologist in: Police investigation, Courts, Correctional institutions Branches: Criminal psychology, Investigative psychology, Legal psychology. Ethics in forensic psychology	7 Hrs.	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. - Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. - Ask students to create concept maps that illustrate the relationships between different concepts.
Unit II	Criminal Behavior & Personality Theories of criminal behavior: Biological theories (Lombroso, modern biosocial views). Psychological theories (Freud, behaviorism, cognitive theory) Social learning theory. Psychological Factor & delinquency: Antisocial personality disorder, Psychopathy & sociopathy. Juvenile delinquency: Causes and prevention. Substance Abuse and crime.	8 Hrs.	8 Marks	
Unit III	Investigative & Applied Forensic Psychology Criminal profiling: Types (organized/disorganized offenders), Method (FBI approach) Eyewitness testimony: Memory and perception, Factors affecting	7Hrs	7 Marks	

	reliability. Role of media in India. Narcho analysis, polygraph and brain mapping.			7. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. 8. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. 9. Any other innovative pedagogy as applicable.
Unit IV	Psychology in Legal & Correctional System Courtroom psychology: competency, insanity defense, expert testimony role. Correctional psychology: objectives/importance, Counseling and therapy. Landmark Indian judgments (Selvi case, Nirbhaya, etc.) Mental Health Act, 1987 (Overview)	8 Hrs.	8 Marks	
Referen ces:	1. Curt R. Bartol – Criminal Behavior: A Psychological Approach 2. Huss – Forensic Psychology 3. Howitt – Forensic and Criminal Psychology 4. Bartol & Bartol – Introduction to Forensic Psychology 5. Fourth Edition The handbook of Forensic Psychology BY Irving B. Weiner Randy K. Otto 6. Fifth Edition Introduction to Forensic Psychology Research and Application Curt R. Bartol Anne M. Bartol. 7. Veeraraghavan, Vimala (2009). Handbook of Forensic Psychology. SelectScientific Publishers, New Delhi. 8. Harmening, W and Gamez, A. M. (2016). Forensic Psychology. Delhi: Web resources: 1. American Psychological Association (APA): The APA Forensic Psychology 2. American Academy of Forensic Sciences 3. https://leginfo.legislature.ca.gov/faces/codes.xhtml 4. https://bjs.ojp.gov/ 5. https://abfp.com/ 6. https://catalogue.libraries.coop/cgi-bin/ezproxy/bnm/ezproxy.cgi?url=ezp.2aHR0cDovL3d3dy52aXUuZWJsaWluY29tL3BhdHJvbi9GdWxsUmVjb3JkLmFzcHg.cD02NzgyNjQ 7. https://catalogue.libraries.coop/cgi-bin/ezproxy/bnm/ezproxy.cgi?url=ezp.2aHR0cDovL3d3dy52aXUuZWJsaWluY29tL3BhdHJvbi9GdWxsUmVjb3JkLmFzcHg.cD01MTQzMjY- 8. https://catalogue.libraries.coop/cgi-bin/ezproxy/bnm/ezproxy.cgi?url=ezp.2aHR0cDovL3NpdGUuZWJyYXJ5LmNvbS9saWlvdml1L0RvYz9pZD0xMDA1ODE5NQ--			
Model Questio ns:	Short Type (At least 6) (1 Marks each) 1. Define forensic psychology. 2. What is criminal profiling? 3. Who is considered a juvenile offender? 4. What is eyewitness testimony? 5. What is the role of a forensic psychologist in court? 6. What is victimology? Answer in brief (At least 6) (3 Marks each) 1. Explain the scope of forensic psychology. 2. Discuss the importance of criminal profiling in investigations. 3. Describe the psychological factors influencing criminal behavior. 4. Explain the role of forensic psychologists in correctional settings. 5. What are the challenges associated with eyewitness testimony? 6. Differentiate between forensic psychology and clinical psychology. Answer in Detail (At least 4) (6 Marks each) 1. Discuss the history, development, and scope of forensic psychology in detail. 2. Explain various theories of criminal behavior and their relevance in forensic psychology. 3. Describe the role and responsibilities of forensic psychologists in criminal investigations and court proceedings. 4. Discuss criminal profiling techniques and their applications in solving crimes. MCQs for Internal Assessment (At least 4) 1. Forensic psychology mainly deals with the application of psychology to the: a) Education system b) Legal and criminal justice system c) Business sector d) medical field Answer: b) Legal and criminal justice system 2. Criminal profiling is primarily used to:			

	a) Diagnose diseases b) Predict weather conditions c) Identify characteristics of offenders d) Treat victims Answer: c) Identify characteristics of offenders 3. Which branch studies victims and their relationship with offenders? a) Psychiatry b) Victimology c) Neurology d) Sociology Answer: b) Victimology 4. Eyewitness testimony is important in: a) Cooking b) Criminal investigations c) Sports training d) Marketing Answer: b) Criminal investigations 5. A forensic psychologist may work in: a) Courts b) Prisons c) Police departments d) All of the above Answer: d) All of the above 6. Juvenile delinquency refers to: a) Adult criminal behavior b) Crimes committed by organizations c) Criminal acts by minors d) Cybercrime only Answer: c) Criminal acts by minors 7. The assessment of a criminal's mental state is performed by: a) Engineer b) Forensic psychologist c) Architect d) Pharmacist Answer: b) Forensic psychologist 8. Which psychological factor may contribute to criminal behavior? a) Stress b) Aggression c) Personality disorders d) All of the above Answer: d) All of the above
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Course Category: **Major (Theory)**
117231 Forensic Medicine

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117231	Forensic Medicine	2	30	2 Hrs	30+20=50

Course Objectives:	1. The core objective of forensic medicine is to train forensic professionals to apply medical knowledge in the administration of justice. 2. It ensures physicians can accurately identify trauma, determine the cause and time of death, handle medico-legal evidence, and strictly adhere to medical ethics and the law. 3. To examine the bodies of the dead or injured in order to determine the cause of death or injury, as well as to determine the possible criminal element in the act.
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Course Outcomes:	After successful completion of the course, a student will be able to- 1. Focus on equipping forensic science students with the practical skills to investigate causes of death, manage clinical poisoning, interpret trauma, and navigate medico-legal procedures. 2. Establishment of identity of an individual in doubtful case, involves the collection, analysis, interpretation, and presentation of evidence in legal cases. 3. equipped with the necessary knowledge and skills to accurately assess and document injuries and provide expert opinions on causes of death and other relevant medical information that may have legal implications. 4. The importance of identity of an individual 5. Understand forensic medicine principles and medico-legal procedures. 6. Identify signs of death, post-mortem changes, and causes/modes of death. 7. Apply knowledge to autopsy procedures and forensic reports.
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Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Forensic Medicine and Legal Procedures Definition, scope, and history of forensic medicine (global and Indian context). Medico-legal aspects: Inquest (police, magisterial, coroner's), exhumation, dying declaration/deposition, medical certificates, post-mortem reports. Legal procedures: Indian Penal Code sections relevant to medical jurisprudence, Indian Evidence Act (Sections 45, 293). Medical ethics and professional conduct. Negligence and liabilities of doctors.	8 Hrs.	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics
Unit II	Death and Post-Mortem Changes Definition and types of death: Somatic/molecular, natural/violent, modes (syncope, asphyxia, coma). Signs of death: Immediate (cessation of vital functions) and delayed (rigor mortis, algor mortis, livor mortis). Post-mortem changes: Factors affecting changes, manners of death (Natural, accidental, suicidal, homicidal) Time since death estimation	7 Hrs.	7 Marks	
Unit III	Injuries and Violent Deaths Classification of injuries: Mechanical (abrasion, bruise, laceration, incised/stab wounds), defense/self-inflicted. Types of wounds, thermal and other injuries, Age of Injuries Asphyxial deaths: Hanging, strangulation, throttling, suffocation, drowning (post-mortem findings). Underlying Cause: (Road traffic accident, Chronic illness), Immediate Cause of Death (Cardiac arrest, Respiratory failure)	8 Hrs.	8 Marks	
Unit IV	Autopsy, Identification and Special Topics Medico-legal autopsy: Objectives, rules, Grievous Hurt (IPC Section 320), Medico-	7 Hrs.	7 Marks	

	Legal Importance of Wounds Personal identification: Race, sex, age, stature from skeleton; forensic odontology, fingerprints basics. Infanticide, sexual offenses, forensic psychiatry (insanity, criminal responsibility). Concept of Euthanasia & case studies.			through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
References:	1. Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology 2. Textbook of Forensic Medicine and Toxicology by Anil Aggrawal 3. Review of Forensic Medicine and Toxicology by Gautam Biswas 4. The Essentials of Forensic Medicine and Toxicology" by K.S. Narayan Reddy 5. Textbook of Forensic Medicine and Toxicology" by V.V. Pillay. 6. Textbook of Forensic Medicine and Toxicology 2nd/2026 K Tamilmani 7. Handbook of Forensic Autopsy: Cause of Death 1st/2026 N Srinivasa Reddy 8. Simpsons Forensic Medicine 15th/2026 Jason Payne-James, Richard Martin Jones Web resources: 1. https://www.ijfmt.com/ 2. https://libguides.pcom.edu/forensic_medicine 3. https://www.forensicsciencesimplified.org/ 4. https://www.pbs.org/wgbh/pages/frontline/death-by-fire/ 5. https://www.atf.gov/arson 6. https://www.nist.gov/osac/subcommittees/fire-explosion-investigation 7. https://nij.ojp.gov/library/nij-funded-software-tools-apps-and-databases			
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Define forensic medicine. 2. What is autopsy? 3. What is rigor mortis? 4. Define poisoning in forensic science. 5. What is the significance of postmortem examination? 6. What is forensic toxicology? Answer in brief (At least 6) (3 Marks each) 1. Explain the scope and importance of forensic medicine. 2. Describe the different types of injuries encountered in forensic practice. 3. Explain the stages of rigor mortis. 4. Discuss the role of forensic medicine in criminal investigations. 5. Differentiate between suicidal, homicidal, and accidental deaths. 6. Explain the importance of forensic toxicology in poisoning cases. Answer in Detail (At least 4) (6 Marks each) 1. Discuss the history, development, and scope of forensic medicine in detail. 2. Explain the medico-legal importance of postmortem examination and its procedure. 3. Describe different types of mechanical injuries and their medico-legal significance. 4. Discuss various causes of death and methods used to determine the cause and time of death. MCQs for Internal Assessment (At least 4) 1. Forensic medicine primarily deals with the application of medical knowledge to: a) Agriculture b) Law and justice c) Engineering d) Commerce Answer: b) Law and justice 2. An autopsy is conducted to: a) Treat patients b) Determine cause of death c) Perform surgery d) Study genetics Answer: b) Determine cause of death 3. Rigor mortis refers to: a) Cooling of the body b) Discoloration of skin			

	c) Stiffening of muscles after death d) Decomposition of tissues Answer: c) Stiffening of muscles after death 4. Which branch deals with the study of poisons? a) Pathology b) Toxicology c) Hematology d) Microbiology Answer: b) Toxicology 5. A bruise is also known as: a) Abrasion b) Incision c) Contusion d) Laceration Answer: c) Contusion
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Course Category: **Major (Theory)**

117232 Environmental & Wildlife Forensics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117232	Environmental & Wildlife Forensics	2	30	2 Hrs.	30+20=50
Course Objectives:		- To introduce the fundamental concepts and techniques of to uncover the objective truth and provide reliable, impartial scientific evidence to be used in a court of law. - To allow students to gain a deep understanding of the application of forensics within the fields of environmental and wildlife crime, and to critically evaluate relevant case studies.					
Course Outcomes:		Upon completion of this course, students will be able to: - Developing critical thinking for resource management, analyzing pollution and climate change, and actively applying sustainable practices in daily life and society. - Analyze and interpret center on investigating biodiversity crimes, handling biological evidence, and navigating environmental legislation. - Demonstrate an effective understanding of the role of chemical and biological science in the investigation of environmental and wildlife-related crimes, including a deep understanding of the technical aspects of the investigation. - Understand and apply to simulated scenarios, key pieces of national and international legislation which govern environmental and wildlife crimes. - To understand the scientific techniques associated with the analysis of evidence including microscopy and DNA analysis - Introduce wildlife and environmental forensics principles and applications. - Learn species identification, evidence collection, and analysis techniques. - Understand wildlife crimes, investigation, and legal frameworks. - Develop skills for conservation through forensic science.					
Unit	Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to Environmental and Wildlife Forensics Definition, scope, and history of wildlife forensics; Difference between Environmental forensics & Wildlife forensics, role in conservation and law enforcement. Ecology basics: Ecosystems, biodiversity, Role of forensic experts and agencies Environmental forensics: Pollution (air, water, soil), Illegal waste disposal Protected species: Endangered animals, plants, reptiles (Indian context).			8 Hrs.	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions.	
Unit II	Basic concepts of Evidence Collection Morphological identification: Anatomy, morphology, pugmarks, skulls, hair, feathers, scales, wood/ plant parts, Collection/preservation. Types of environmental evidence: Soil, Water, Air (particulate matter) Sources of contamination: Industrial discharge, Oil spills and case studies. Specimen handling: Safety measures, documentation, Importance of environmental monitoring (Bio surveillance).			7 Hrs.	7 Marks	Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions.	
Unit III	Wildlife Crimes and Investigation Types of crimes: Poaching, illegal trade/trafficking of animal parts, habitat destruction. Common wildlife articles: Ivory, Skins, Horns and their forensic significance Identification: Physical characteristics, Documentation-based identification, Role of wildlife protection agencies. Case studies: international trafficking.			8 Hrs.	8 Marks	Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research.	
Unit IV	Legal Aspects and Conservation Laws and regulations: Wildlife Protection Act			7 Hrs.	7 Marks		

	1972, International conventions, Penalties and legal provisions Conservation strategies: Ecotourism, protected areas, role of forensics in enforcement. Role of: Forest department, Pollution control boards; Ethical and conservation issues. Environmental laws: Environment Protection Act, Water Act, Air Act			Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
References:	1. Fundamentals of Forensic Science – Houck & Siegel 2. Forensic Science in India by Nanda & Tewari 3. Wildlife Forensic Investigation, Principles and Practice - Jan Bundschuh 4. Wildlife Protection Act (Bare Act – simplified reading) 5. Handbook on Wildlife Law Enforcement in India by Samir Sinha 6. Wildlife Forensic Investigation: Principles and Practice - J. E. Cooper & Cooper 7. Wildlife Forensics: Methods and Applications (Developments in Forensic Science) - Jane E. Huffman. 8. Introducing the Synergy Between Forensic Science and Environmental Analysis Mahipal Singh Sankhla, Kumud Kant Awasthi, Tina Sharma, Rajeev Kumar Web resources: 1. https://www.scribd.com/document/579848949/WILDLIFE-FORENSICS 2. https://wii.gov.in/wildlife-forensic-conservation-genetics-cell 3. https://www.sifs.in/course-details/online-course-wildlife-forensics 4. https://v1.wii.gov.in/wildlife_forensic			
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Define environmental forensics. 2. What is wildlife forensics? 3. What is biodiversity? 4. Define poaching. 5. What is the role of DNA analysis in wildlife forensics? 6. What is environmental pollution?			
	Answer in brief (At least 6) (3 Marks each) 1. Explain the scope and importance of environmental forensics. 2. Discuss the role of forensic science in wildlife crime investigations. 3. Explain different types of environmental pollution. 4. Describe the methods used for wildlife identification. 5. Discuss the importance of biodiversity conservation. 6. Explain the applications of DNA fingerprinting in wildlife forensics.			
	Answer in Detail (At least 4) (6 Marks each) 1. Discuss the history, scope, and significance of environmental and wildlife forensics. 2. Explain various types of environmental pollution and forensic methods used for their investigation. 3. Describe wildlife crimes, their causes, and the role of forensic science in controlling them. 4. Discuss DNA analysis techniques used in wildlife forensic investigations.			
	MCQs for Internal Assessment (At least 4) 1. Environmental forensics mainly deals with: a) Space science b) Investigation of environmental contamination c) medical treatment d) Robotics Answer: b) Investigation of environmental contamination 2. Wildlife forensics is primarily used to investigate: a) financial fraud b) Wildlife crimes c) Cybercrime d) Traffic violations Answer: b) Wildlife crimes 3. Illegal hunting of wild animals is known as: a) Grazing b) Farming c) Poaching d) Migration Answer: c) Poaching 4. DNA analysis in wildlife forensics helps in: a) Weather prediction			

	b) Species identification c) Soil irrigation d) Industrial production Answer: b) Species identification 5. Which of the following is a major environmental pollutant? a) Oxygen b) Nitrogen c) Plastic waste d) Water vapor Answer: c) Plastic waste
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Course Category: **Major Lab**
117233 Forensic Psychology Lab 15

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117233	Forensic Psychology Lab 15	2	60	4 h	25+25= 50

Course Objectives:	1. A Forensic Psychology Laboratory course aims to bridge psychological theory with legal and criminal justice applications. 2. The primary objectives are to teach students how to conduct competency and mental health evaluations, apply deception detection techniques, analyze eyewitness testimonies, and understand the ethical responsibilities of serving as an expert witness. 3. Administer, score, and interpret standardized personality and risk-assessment tests to determine competency to stand trial or criminal responsibility.	
Course Outcomes:	Upon successful completion of this course, students will be able to: 1. Understand and apply modern behavioural analysis techniques to suspects and crime scenes. 2. Students develop practical skills in assessing mental competence, interpreting behavioural patterns, evaluating eyewitness testimony, and applying diagnostic tools within the criminal justice system. 3. Administer, score, and interpret standardized psychological and neuropsychological tests to gauge a defendant's fitness to stand trial. 4. Design experiments and conduct case studies to identify the cognitive factors—such as memory decay, suggestive questioning, and lineup procedures—that impact the accuracy of eyewitness identification. 5. Apply behavioural science frameworks (such as the FBI's crime scene classification model) to reconstruct crime scenes, analyse victimology, and generate offender profiles. 6. Gain hands-on experience and critical evaluation skills regarding advanced investigative techniques like Polygraphy, Statement Analysis, and Brain Electrical Oscillation Signatures. 7. Develop skills in interviewing victims of trauma, assessing the psychological impact of crimes, and contributing to victim advocacy.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	1. Consult on child custody case. 2. Develop mental health program for correctional staff. 3. Counsel police officers and their families. 4. Outline the history of forensic psychology. 5. Describe the roles and responsibilities of forensic psychologists	• Experiential Learning: Hands-on experimentation using psychological tests model kits facilitates understanding of various psychological tests. • Inquiry-Based Learning: Students hypothesize psychological tests are analyzed, fostering critical thinking. Investigation of crime and psychological tests understanding of forensic principles. • Collaborative Learning: Group-based psychological tests experiments encourage teamwork and peer learning. Discussions on psychological tests enhance conceptual clarity and knowledge retention. • Technology-Enhanced Learning: Digital tools, including psychological tests software. Virtual simulations supplement experimental learning, providing additional insights into complex concepts. • Reflective and Analytical Learning: Maintaining laboratory records supports systematic documentation of observations, calculations, and deviations. Post-experiment discussions encourage critical evaluation and correlation of experimental results with theoretical principles and real-world applications.
Forensic Psychology practical	1. Introduction to psychological tests. 2. To determine the Blind fold test, 3. Eysenck's' Personality Inventory. 4. State Trait Anxiety Scale 5. To determine Verbal Intelligence Test., 6. Determine the Aggression Testing Scale. 7. Illustrate the Sentence Completion Test. 8. Bhatia Battery Performance Test. 9. P.F. test. 10. Raven's Standard Progressive Matrices 11. Picture Frustration Test 12. Determine the Thematic Apperception Test. 13. Determine the Measuring of Locus of control. 14. To identify the Differential Aptitude Test. 15. Minnesota Multiphasic Personality Inventory. 16. Determine Rorschach Inkblot Test 17. Wechsler's' Intelligence Scale for children,	

	18. Wechsler's' Adult Intelligence Scale 19. Colored Progressive Matrices, 20. Thinking and Problem solving	Any other innovative pedagogy as applicable.
References	1. Handbook of Forensic Psychology by Dr. Vimala Veeraraghavan 2. Psychological Evaluations for the Courts by Melton et al 3. The Forensic Laboratory Handbook: Procedures and Practice - Ashraf Mozayani 4. Psychological Evaluations for the Courts (by G.B. Melton, J. Petrila, et al.) 5. Practical Psychology for Forensic Investigations and Prosecutions (by Mark R. Kebbell and Graham M. Davies) 6. FORENSIC PSYCHOLOGY Indira Gandhi National Open University. Web resources: 1. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SPSY1502.pdf 2. https://pressbooks.bccampus.ca/psyc268/chapter/chapter-1-2/ 3. https://www.blackwellpublishing.com/intropsych/pdf/chapter21.pdf 4. https://in.sagepub.com/en-in/ind/introduction-to-forensic-psychology/book240250 5. https://egyankosh.ac.in/bitstream/123456789/89873/1/Block-1.pdf	
Model Questions:	NA	

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

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| • Active participation in activities | 10 Marks |
| • Continuous Assessment Tests (CAT) (At least three tests) * | 10 Marks |
| • Submission of duly certified practical record | 05 Marks |
| Total | 25 Marks |

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

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| • Exercise 1 (Organic Chem Practical) | 10 Marks |
| • Exercise 2 (Physical Chem Practical) | 10 Marks |
| • Viva-Voce (external) | 05 Marks |
| Total | 25 Marks |

Course Category: Major- Elective (Theory)							
117234		Disaster Victim Identification and Imaging Techniques					
Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117234	Disaster Victim Identification and Imaging Techniques	2	30	2 Hrs.	30+20=50
Course Objectives:		1. Equipping forensic specialists, medical professionals, and disaster responders with the skills to identify deceased victims of mass fatality incidents accurately, ethically, and scientifically. 2. Learn to establish and maintain rigorous forensic pathways to document, track, and prevent the loss or damage of evidence and human remains.					
Course Outcomes:		After successful completion of the course, a student will be able to- 1. Understand fundamentals of disaster victim identification (DVI) 2. Learn basic identification methods used in mass disasters 3. Introduce imaging techniques in forensic documentation 4. Develop awareness of standard procedures and ethical issues. 5. Understand how to use non-invasive imaging to locate metal fragments, detect trauma, and map internal structures before invasive dissection 6. Develop the skills to accurately chart dentition, record anomalies, and compare ante-mortem and post-mortem dental data.					
Unit	Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to Disaster Victim Identification Definition and scope, Challenges in mass disaster situations. Types of disasters: Natural, and Man-made. Need and importance of victim identification. Role of forensic experts and Police agencies			7 Hrs.	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model /forensic kits Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.	
Unit II	Basic Methods of Identification Primary identification methods: DNA profiling Dental records, DNA, Fingerprints. Secondary identifiers: Physical marks (tattoos, scars), Personal belongings, Clothing, Physical features Postmortem data collection, Antemortem data collection. Anthropology basics: Age/sex/stature from bones in mass graves.			8 Hrs.	8 Marks		
Unit III	Forensic Imaging Techniques Applications in DVI: Virtual autopsy (PMCT), detecting cause of death (e.g., bullet tracks), body packing. Role of imaging in identification and documentation Types of imaging: Photography, Video recording, radiology basics. Digital imaging basics: Storage, Handling, Authenticity			7 Hrs.	7 Marks		
Unit IV	Legal, Ethical Aspects & Case Studies DVI operations: Scene security, evidence chain of custody, family liaison. Respect for human dignity, Handling of dead bodies, Consent and identification, Data privacy and sensitivity. Case studies: Air India crash, Uttarakhand floods, 9/11, Mumbai train blasts. Emerging trends: AI in imaging, portable scanners			8 Hrs.	8 Marks		

References:	1. Disaster Victim Identification in the 21st Century: A US Perspective John A Williams, Victor W Weedn 2. Disaster Victim Identification - Jay H. Levinson 3. National Disaster Management Guidelines on Comprehensive Disaster Victim Identification and Management - National Disaster Management Authority Ministry of Home Affairs Government of India. 4. Disaster Victim Identification, or DVI, is the method used to identify victims of mass casualty incidents, either man-made or natural. Web resources: 1. https://www.sciencedirect.com/science/article/abs/pii/S2212478016300363 2. https://link.springer.com/collections/fbjchfc 3. https://ndma.gov.in/sites/default/files/PDF/Guidelines/final%20pdf%20DVI_SSSD.pdf 4. https://www.interpol.int/en/How-we-work/Forensics/Disaster-Victim-Identification-DVI 5. https://thanatoradiology.ru/wp-content/uploads/2024/ 6. https://www.sciencedirect.com/science/article/abs/pii/S2212478015000064
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Define Disaster Victim Identification (DVI). 2. What is forensic imaging? 3. What is the purpose of postmortem identification? 4. Define radiography in forensic science. 5. What is DNA profiling in DVI? 6. What is the role of dental records in victim identification? Answer in brief (At least 6) (3 Marks each) 1. Explain the importance of Disaster Victim Identification in forensic investigations. 2. Discuss the role of forensic imaging techniques in victim identification. 3. Explain the use of fingerprint analysis in DVI. 4. Describe the importance of dental examination in identifying disaster victims. Answer in Detail (At least 4) (6 Marks each) 1. Discuss the principles, objectives, and phases of Disaster Victim Identification. 2. Explain various methods used for victim identification in mass disasters. 3. Describe the role of radiology and advanced imaging techniques in forensic investigations. 4. Discuss the importance of DNA profiling, fingerprint analysis, and dental records in DVI. 5. Explain the procedures for collection, preservation, and analysis of evidence in disaster victim identification. MCQs for Internal Assessment (At least 4) 1. Disaster Victim Identification (DVI) is mainly used to: a) Diagnose diseases b) Identify victims of mass disasters c) Study wildlife d) Monitor pollution Answer: b) Identify victims of mass disasters 2. Which imaging technique commonly uses X-rays? a) MRI b) Ultrasonography c) Radiography d) Endoscopy Answer: c) Radiography 3. DNA profiling is useful in DVI for: a) Measuring height b) Species identification c) Personal identification d) Blood pressure analysis Answer: c) Personal identification 4. Fingerprint analysis is based on the principle that fingerprints are: a) Temporary b) Identical in all humans c) Unique to each individual d) Visible only under UV light Answer: c) Unique to each individual 5. Dental records are especially useful in identifying: a) Fresh food samples b) Burned or decomposed bodies c) Water samples d) Soil contaminants Answer: b) Burned or decomposed bodies

	6. Which organization provides international guidelines for DVI? a) WHO b) INTERPOL c) UNESCO d) NASA Answer: b) INTERPOL
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Course Category: Major Elective Lab
117235 DVIIT Practical Lab 16 A

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117235	DVIIT Practical Lab 16 A	2	60	4 h	25+25= 50

Course Objectives:	Disaster Victim Identification (DVI) practical's train forensic experts, radiologists, and odontologists to apply imaging modalities to mass fatality events. The goal is to rapidly, accurately, and respectfully recover biometric data—such as dental records, skeletal traits, and personal effects—by comparing post-mortem scans with ante-mortem data to establish a positive identity.		
Course Outcomes:	Upon successful completion of this course, students will be able to:		
Unit System	Contents	Incorporation of Pedagogies	
Tutorial and Discussion	1. Anthropological analysis, such as examining bone structure, trabecular patterns, and skeletal development to build a biological profile. 2. To study the standard procedure and protocols followed in disaster victim identification DVI during mass disasters and medico-legal investigations.	• Experiential Learning: Hands-on experimentation using molecular model kits facilitates understanding of Anthropological analysis. To study various methods, reinforce theoretical concepts. • Inquiry-Based Learning: Students hypothesize the disaster and validate predictions using various kits. Discrepancies in experimental values of disaster victim identification are analyzed, fostering critical thinking. Investigation of disaster victim changes promotes a deeper understanding of various case studies principles. • Collaborative Learning: Group-based disaster identification experiments encourage teamwork and peer learning. Discussions on Disaster victim identification methods enhance conceptual clarity and knowledge retention. • Technology-Enhanced Learning: Digital tools, including DNA extraction kits, fingerprint kits improve precision in data collection and analysis. Virtual simulations supplement experimental learning, providing additional insights into complex concepts. • Reflective and Any other innovative pedagogy as applicable.	
DVIIT Practical	1. To simulate a Mass disaster scene 2. To perform Anti-mortem data collection 3. To perform post-mortem documentation 4. To perform Chain of Custody in Mass disaster 5. To study Demirjian's method 6. To study Gustafson's method 7. To study burnt remain analysis 8. To study Forensic odontology charting 9. To study Reconcilable using Plass data DVI. 10. To study DNA sampling from degraded remains 11. Identification of hazard at disaster sites.		
References	1. Forensic Anthropology: Current Methods and Practice - Angi M. Christensen, Nicholas V. Passalacqua, and Eric J. Bartelink 2. Manual of Forensic Anthropology- C. K. Parikh 3. Knight’s Forensic Pathology- Pekka Saukko and Bernard Knight. 4. Disaster Victim Identification: Experience and Practice - INTERPOL contributors. 5. Forensic Photography: Importance and Uses- Edward M. Robinson Web resources: 6. https://ndma.gov.in?utm 7. https://swgdvi.org/?utm 8. https://forensicradiography.com/?utm 9. https://icmp.int/what-we-do/science-and-technology/disaster-victim-identification-dvi/ 10. https://missingpersons.icrc.org/library/forensic-anthropology-disaster-victim-identification-best-practice-recommendations 11. https://jfmtonline.com/index.php/jfmt/article/view/1027		
Model Questions:	NA		

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

• Active participation in activities	10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	10 Marks
• Submission of duly certified practical record	05 Marks
Total	25 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

• Exercise 1	10 Marks
• Exercise 2	10 Marks
• Viva-Voce (external)	05 Marks
Total	25 Marks

Course Category: **Major- Elective (Theory)**
117236 Criminal Profiling and Behavioral Analysis

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117236	Criminal Profiling and Behavioral Analysis	2	30	2 Hrs.	30+20=50

Course Objectives:	Understand the principles of document examination. Learn techniques for detecting forgeries and alterations in documents. Study methods for investigating financial fraud and forgery. Explore the role of handwriting analysis in questioned document cases. Examine case studies on document fraud investigations.
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Course Outcomes:	After successful completion of the course, a student will be able to- 1. Analyze questioned documents for signs of forgery. 2. Detect alterations, erasures, and tampering in documents. 3. Investigate cases involving financial fraud and forgery. 4. Conduct handwriting analysis in forensic contexts. 5. Present findings in a forensic report on questioned document analysis. 6. Develop awareness of documentation and ethical practices
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Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Criminal Profiling Definition and scope of criminal profiling; History and evolution of profiling; Types of criminal profiling: Inductive profiling, Deductive profiling; Role of profiler in criminal investigation; Relationship between profiling and forensic psychology; Ethical and legal considerations in profiling.	8 Hrs.	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
Unit II	Criminal Behavior and Personality Psychological theories of criminal behavior; Personality traits of offenders; Behavioral patterns in violent crimes; Organized vs disorganized offenders; Motive analysis in crimes; Psychopath and antisocial personality disorder; Serial offenders and repeat criminality	7 Hrs.	7 Marks	
Unit III	Crime Scene Behavioral Analysis Crime scene assessment techniques; Behavioral evidence analysis; Victim-offender relationship; Signature vs modus operandi (MO); Geographic profiling; Staging and posing at crime scenes Interview and interrogation psychology	8 Hrs.	8 Marks	
Unit IV	Applied Criminal Profiling Profiling in homicide investigations Sexual offense profiling Cyber behavioral profiling Terrorism and extremist behavior analysis. Case studies in criminal profiling Challenges and limitations of profiling Future trends in behavioral forensics.	7 Hrs.	7 Marks	

References:	1. Forensic Accounting and Fraud Examination by Mary-Jo Kranacher, Richard Riley, Joseph T. Wells 2. Fraud Auditing and Forensic Accounting by Tommie W. Singleton, Aaron J. Singleton 3. Financial Investigation and Forensic Accounting, Third Edition, George A. Manning, Ph. D, CFE, EA 4. A Guide to Forensic Accounting Investigation by Steven L. Skalak, Thomas W. Golden,
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	Mona M. Web resources: 1. https://www.robsonforensic.com/ 2. http://forensicscience.iisuniv.ac.in/ 3. https://arxiv.org/abs/2006.16057?utm 4. https://www.fbi.gov/how-we-can-help-you/safety-resources/scams-and-safety/common-scams-and-crimes 5. https://fraudopedia.co.in/online-education
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Define criminal profiling. 2. Differentiate between modus operandi and signature behavior. 3. What is behavioral evidence analysis? 4. Explain organized and disorganized offenders. 5. What is victimology in criminal investigations? 6. Define geographic profiling.
	Answer in brief (At least 6) (3 Marks each) 1. Explain the concept, scope, and importance of criminal profiling in forensic investigations. 2. Discuss various psychological theories related to criminal behavior and offender personality. 3. Describe organized and disorganized crime scenes with suitable examples.
	Answer in Detail (At least 4) (6 Marks each) 1. Discuss the methods and techniques used in crime scene behavioral analysis. 2. Explain the applications, advantages, and limitations of criminal profiling in modern investigations 3. Explain the role of victimology in behavioral analysis and criminal profiling.
	MCQs for Internal Assessment (At least 4) 1. Criminal profiling is mainly used to: A. Identify fingerprints B. Predict offender characteristics C. Analyze blood samples D. Determine cause of death 2. The term “modus operandi” refers to: A. Offender’s emotional motive B. Victim’s personality C. Method used to commit crime D. Crime scene photography 3. Which type of offender usually plans the crime carefully? A. Organized offender B. Disorganized offender C. Juvenile offender D. Habitual offender 4. Signature behavior in crime refers to: A. Legal signature of accused B. Unique psychological behavior of offender C. Fingerprint pattern D. Victim identification method 5. Geographic profiling helps investigators determine: A. Blood group of suspect B. Mental illness of offender C. Probable area of offender residence D. Weapon used in crime 6. Victimology is the study of: A. Criminal law B. Victims and victimization C. Fingerprint patterns D. Toxic substances

Course Category: Major Elective Lab							
117237 Criminal Profiling and Behavioral Analysis Lab 16 B							
Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117237	Criminal Profiling and Behavioral Analysis Lab 16 B	2	60	4 h	25+25= 50
Course Objectives:		Examine handwriting samples for forensic analysis. - Analyze documents for signs of forgery or alterations. - Apply forensic techniques to detect counterfeit or fraudulent documents. - Investigate financial fraud involving documents. - Prepare forensic reports on questioned document cases.					
Course Outcomes:		Upon successful completion of this course, students will be able to: - Perform forensic analysis of handwriting and signatures. - Detect forgeries and alterations in documents. - Investigate fraudulent documents using forensic tools. - Present findings from financial fraud investigations. - Create forensic reports on questioned documents and fraud cases.					
Unit System		Contents			Incorporation of Pedagogies		
Tutorial and Discussion		Handwritten letters Signatures Pattern Cheques Passports Currency notes Contracts Printed documents Digital printouts			Experiential Learning: Hands-on experimentation using forensic kits, Handwriting-general characteristics. enhance practical skills, while handwriting written on usual surface. and calorimetric Simulated and traced forgeries measurements reinforce theoretical concepts. Inquiry-Based Learning: Students hypothesize Handwriting-general characteristics, and validate predictions using models. mechanical and chemical use of erasers on the documents., fostering critical thinking. Investigation of writing inks by TLC/ Paper chromatography. changes promote a deeper understanding of Fraud Investigation principles. Collaborative Learning: Group-based disguised writings experiments encourage teamwork and peer learning. Discussions on counterfeit currency by using microscopy and UV light enhance conceptual clarity and knowledge retention. Technology-Enhanced Learning: Digital tools, including molecular simulation software, improve precision in data collection and analysis. Virtual simulations supplement experimental learning, providing additional insights into complex concepts. Reflective and Analytical Learning: Maintaining laboratory records supports systematic documentation of observations, calculations, and deviations. Post-experiment discussions encourage critical evaluation and correlation of experimental results with theoretical principles and real-world applications. Any other innovative pedagogy as applicable.		
Criminal Profiling and Behavioral Analysis Practical		1. Identification of Handwriting-general characteristics, natural variations, fundamental divergences and individual characteristics. 2. To detect Simulated and traced forgeries. 3. To study the handwriting of person suffering from illness and handwriting written on usual surface. 4. Examination of additions, alterations, and obliterations in the documents. 5. Examination of mechanical and chemical use of erasers on the documents. 6. Examination of indented handwriting. 7. Examination of writing inks by TLC/ Paper chromatography. 8. Examination of sequence of intersecting strokes. 9. Examination of disguised writings. 10. Examination of counterfeit currency by using microscopy and UV light. 11. To examine the security features of passports.					
References		1. Forensic Accounting and Fraud Examination by Mary-Jo Kranacher, Richard Riley, Joseph T. Wells 2. Fraud Auditing and Forensic Accounting by Tommie W. Singleton, Aaron J. Singleton 3. Financial Investigation and Forensic Accounting, Third Edition, George A. Manning, Ph. D, CFE, EA					

	4. A Guide to Forensic Accounting Investigation by Steven L. Skalak, Thomas W. Golden, Mona M. Clayton Web resources: 1. https://www.robsonforensic.com/ 2. http://forensicscience.iisuniv.ac.in/ 3. https://arxiv.org/abs/2006.16057?utm 4. https://www.fbi.gov/how-we-can-help-you/safety-resources/scams-and-safety/common-scams-and-crimes 5. https://fraudopedia.co.in/online-education
Model Questions:	NA

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment	
• Active participation in activities	10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *	10 Marks
• Submission of duly certified practical record	05 Marks
Total	25 Marks
*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations	
Section 2: External Assessment	
• Exercise 1	10 Marks
• Exercise 2	10 Marks
• Viva-Voce (external)	05 Marks
Total	25 Marks

Course Category: **Minor (Theory)**
117238 Forensic Psychology-3

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117238	Forensic Psychology-3	2	30	2 Hrs.	30+20=50

Course Objectives :	1. Fundamentals of forensic psychology and functional issues of forensic psychology. 2. To make the students proficient in psychological principles and their methods of formulations, preparing them for advanced studies in forensic psychology. 3. To equip the students with a comprehensive understanding of Role of forensic psychologist, enabling them to apply theoretical concepts and experimental techniques to real-world of psychological theories.			
Course Outcomes:	After successful completion of the course, a student will be able to- 1. To understand the nature and scope of forensic psychology; 2. Describe the sub-specialities in forensic psychology. 3. Explain the ethical issues in forensic psychology. 4. Describe the roles and functions of a forensic psychologist; and discuss the qualification and training of forensic psychologist 5. Assessing mental states, understanding criminal behaviour, and navigating courtroom procedures 6. Expert Testimony: Learning how to write formal expert witness reports and present psychological findings clearly and objectively in court. 7. Judicial Reasoning: Understanding the intersection of psychology and criminal law, including how to avoid expert bias and navigate courtroom procedures 8. Criminal Profiling: Analysing patterns of human behaviour, motives, and intent in criminal investigations. 9. Victim Assistance: Developing frameworks to provide psychological support to victims of crime. 10. Identifying and resolving ethical dilemmas unique to forensic settings, such as dual-relationship conflicts.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit-I	Introduction to Forensic Psychology Meaning and scope of psychology. Basic idea of forensic psychology. History and development in India and abroad. Role of forensic psychologists and basic ethics.	8 Hrs.	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
Unit-II	Human Behavior Sensation, perception, memory, and learning. Personality and motivation basics. Criminal behavior and aggression. Juvenile delinquency and substance abuse	7 Hrs.	7 Marks	
Unit-III	Crime and Investigation Theories of criminal behavior. Criminal profiling basics. Eyewitness testimony and memory reliability. Polygraph, Narcho analysis, and brain mapping basics.	8 Hrs.	8 Marks	
Unit-IV	Legal and Correctional Psychology Psychology in courts and legal decisions. Competency and insanity basics. Correctional psychology and rehabilitation. Mental health and basic awareness of legal cases	7 Hrs.	7 Marks	

References	1. Curt R. Bartol – Criminal Behavior: A Psychological Approach 2. Huss – Forensic Psychology 3. Howitt – Forensic and Criminal Psychology 4. Bartol & Bartol – Introduction to Forensic Psychology 5. Fourth Edition The handbook of Forensic Psychology BY Irving B. Weiner Randy K. Otto 6. Fifth Edition Introduction to Forensic Psychology Research and Application Curt R. Bartol Anne M. Bartol. 7. Veeraraghavan, Vimala (2009). Handbook of Forensic Psychology. Select Scientific Publishers, New Delhi. 8. Harmening, W and Gamez, A. M. (2016). Forensic Psychology. Delhi: Web resources: 1. American Psychological Association (APA): The APA Forensic Psychology 2. American Academy of Forensic Sciences 3. https://leginfo.legislature.ca.gov/faces/codes.xhtml 4. https://bjs.ojp.gov/ 5. https://abfp.com/ 6. https://catalogue.libraries.coop/cgi-bin/ezproxy/bnm/ezproxy.cgi?url=ezp 7. https://catalogue.libraries.coop/cgi-bin/ezproxy/bnm/ezproxy.cgi?url=ezp 8. https://catalogue.libraries.coop/cgi- -
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Define forensic psychology. 2. What is criminal profiling? 3. Who is considered a juvenile offender? 4. What is eyewitness testimony? 5. What is the role of a forensic psychologist in court? 6. What is victimology? Answer in brief (At least 6) (3 Marks each) 1. Explain the scope of forensic psychology. 2. Discuss the importance of criminal profiling in investigations. 3. Describe the psychological factors influencing criminal behavior. 4. Explain the role of forensic psychologists in correctional settings. 5. What are the challenges associated with eyewitness testimony? 6. Differentiate between forensic psychology and clinical psychology. Answer in Detail (At least 4) (6 Marks each) 1. Discuss the history, development, and scope of forensic psychology in detail. 2. Explain various theories of criminal behavior and their relevance in forensic psychology. 3. Describe the role and responsibilities of forensic psychologists in criminal investigations and court proceedings. 4. Discuss criminal profiling techniques and their applications in solving crimes. MCQs for Internal Assessment (At least 4) 1. Forensic psychology mainly deals with the application of psychology to the: a) Education system b) Legal and criminal justice system c) Business sector d) medical field Answer: b) Legal and criminal justice system 2. Criminal profiling is primarily used to: a) Diagnose diseases b) Predict weather conditions c) Identify characteristics of offenders d) Treat victims Answer: c) Identify characteristics of offenders 3. Which branch studies victims and their relationship with offenders? a) Psychiatry b) Victimology c) Neurology d) Sociology Answer: b) Victimology 4. Eyewitness testimony is important in: a) Cooking b) Criminal investigations c) Sports training d) Marketing

	Answer: b) Criminal investigations 5. A forensic psychologist may work in: a) Courts b) Prisons c) Police departments d) All of the above Answer: d) All of the above 6. Juvenile delinquency refers to: a) Adult criminal behavior b) Crimes committed by organizations c) Criminal acts by minors d) Cybercrime only Answer: c) Criminal acts by minors 7. The assessment of a criminal's mental state is performed by: a) Engineer b) Forensic psychologist c) Architect d) Pharmacist Answer: b) Forensic psychologist 8. Which psychological factor may contribute to criminal behavior? a) Stress b) Aggression c) Personality disorders d) All of the above Answer: d) All of the above
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Course Category: **Minor Lab**
117239 Forensic Psychology Lab 17

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117239	Forensic Psychology Lab 17	2	60	4 h	25+25= 50

Course Objectives:	1. Understand the application of psychological principles and standardized tests in forensic settings for criminal and civil cases. 2. Demonstrate proficiency in administering, scoring, and interpreting psychological assessments related to personality, intelligence, deception, and competency. 3. Apply behavioral analysis techniques to crime scene data, offender statements, and victimology for profiling purposes. 4. Develop skills in forensic interviewing, risk assessment, and threat assessment using scientific protocols.		
Course Outcomes:	At the end of this course students will be able to: 1. Administer and interpret standardized psychological tests like 16PF, MMPI, Raven’s SPM, Bhatia Battery, and Rorschach Inkblot Test in forensic context. 2. Conduct and analyze deception detection techniques including polygraph, BEOS, layered voice analysis, and Statement Validity Assessment. 3. Prepare criminal psychological profiles by analyzing crime scene behavior, modus operandi, and victim selection patterns. 4. Assess mental state of accused/accuser for fitness to stand trial, criminal responsibility, and competency using structured interviews and MSE. 5. Apply threat assessment models to evaluate risk of violence, suicide, and recidivism in custodial and community settings. 6. Write forensic psychology reports in prescribed format adhering to legal standards.		
Unit System	Contents		Incorporation of Pedagogies
Tutorial and Discussion	1. Consult on child custody case. 2. Develop mental health program for correctional staff. 3. Counsel police officers and their families.	• By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: • Students should be given suitable pre- and post-lab assignments and explanation revising the theoretical aspects of laboratory experiments prior to and after the conduct of each experiment. • Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding. • Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. • Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • Technology Integration: Incorporate digital tools for data analysis and presentation. • Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on chemical lab practices. • Inquiry-Based Learning: Explore topics through questioning, investigation, and research. • Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge	
Forensic Psychology Minor Lab	1. Analysis of case studies related to anatomical and physiological anomalies. 2. Eyewitness Testimony Experiment 3. Memory Recall Test 4. Lie Detection Observation 5. Aggression Scale 6. Personality Assessment 7. Criminal Profiling Case Study 8. Stress and Anxiety Measurement 9. Juvenile Delinquency Case Analysis Interview and Interrogation Simulation		
References	1. "Human Anatomy & Physiology" by Elaine N. Marieb and Katja Hoehn 2. "Anatomy & Physiology: The Unity of Form and Function" by Kenneth S. Saladin 3. "Principles of Anatomy and Physiology" by Gerard J. Tortora and Bryan Derrickson 4. "Essentials of Human Anatomy & Physiology" by Elaine N. Marieb 5. "Human Anatomy & Physiology Laboratory Manual" by Elaine N. Marieb		
Model Questions:	NA		

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

- | | |
|--|-----------------|
| • Active participation in activities | 10 Marks |
| • Continuous Assessment Tests (CAT) (At least three tests) * | 10 Marks |
| • Submission of duly certified practical record | 05 Marks |
| Total | 25 Marks |

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

- | | |
|---|-----------------|
| • Exercise 1 (Inorganic Chem Practical) | 10 Marks |
| • Exercise 2 (Physical Chem Practical) | 10 Marks |
| • Viva-Voce (external) | 05 Marks |
| Total | 25 Marks |

Course Category: Vocational Skill Course VSC
117240 Forensic Instrumentation Lab -18

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117240	Forensic Instrumentation Lab -18	2	60	4 Hrs	50

Course Objectives:	The intended objectives are: The objective of the Forensic Instrumentation practical course is to provide students with practical knowledge and hands-on training in the use of scientific instruments and analytical techniques used in forensic science. The course aims to develop skills in the identification, examination, collection, preservation, and analysis of forensic evidence through modern laboratory instruments. Specific Objectives - To understand the principles and working of forensic laboratory instruments. - To develop practical skills in handling and operating forensic equipment safely and accurately. - To study techniques used in the analysis of biological, chemical, toxicological, and physical evidence. - To train students in interpretation and documentation of instrumental results for forensic investigation. - To familiarize students with quality control, calibration, and maintenance of forensic instruments. - To enhance analytical thinking and scientific approach in criminal investigation. - To understand the role of instrumentation in crime detection and legal proceedings. - To provide experience in preparing laboratory reports and presenting forensic findings scientifically.	
Course Outcomes:	Upon successful completion of this course, students will be able to: - Understand the basic principles, components, and applications of forensic instruments used in crime investigation. - Operate and handle common forensic laboratory instruments safely and effectively. - Analyze different types of forensic evidence such as biological, chemical, toxicological, and physical samples using instrumental techniques. - Apply analytical methods for identification, detection, and comparison of forensic materials. - Interpret instrumental data and prepare scientific laboratory reports accurately. - Demonstrate knowledge of calibration, maintenance, and quality control procedures in forensic laboratories. - Develop problem-solving and analytical skills required for forensic examination and research. - Understand the importance of forensic instrumentation in criminal justice and legal investigations.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	- Identification and use of common laboratory apparatus and forensic equipment. - Calibration and maintenance of basic forensic instruments. - General comparison of Paints, Soils and Glass.	By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of forensic lab practices. A few suggested pedagogies are: • Students should be given suitable pre- and post-lab assignments and explanation revising the theoretical aspects of laboratory experiments prior to and after the conduct of each experiment. • Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • Demonstrations and Simulations: Use virtual
Forensic Instrumentation	Experiments: - Study and use of UV and visible spectrophotometer. - Separation and identification of substances by chromatography techniques (Paper Chromatography/TLC). - Study of spectrophotometer and its applications in forensic analysis. - Detection of drugs, poisons, or chemicals using instrumental methods. - Examination of blood stains and biological samples using forensic instruments. - Analysis of glass, soil, fiber, and paint	

	samples using comparison techniques. - Introduction to toxicological instruments such as GC, HPLC, and UV-Visible Spectroscopy. - Determination of pH of different forensic samples using pH meter. - To study the use and working of a centrifuge and understand the separation of substance based on density using centrifugation technique. - Study and handling of various types of microscope used in forensic examination.	simulations for certain experiments to enhance accessibility and understanding. Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. Technology Integration: Incorporate digital tools for data analysis and presentation. Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on forensic lab practices.
References	- Practical Forensic Microscopy: A Laboratory Manual. - Forensic Analytical Techniques - Forensic Instrumentation. - Criminalistics: An Introduction to Forensic Science - Forensic Science: An Introduction to Scientific and Investigative Techniques - Measurement Uncertainty in Forensic Science: A Practical Guide Web resources: https://forensicscience.iisuniv.ac.in/ https://science.psu.edu/bmb/forensics/research/instruments https://www.wiley-vch.de/de/fachgebiete/naturwissenschaften/analytical-techniques-in-forensic-science https://www.wiley-vch.de/en?isbn https://www.thermofisher.com/in/en/home/industrial/spectroscopy-elemental-isotope-analysis/molecular-spectroscopy	
Model Questions:	NA	

Distribution of Marks and the scheme of (VSC) Practical Examination is as follows:

Section I: Continuous Internal Assessment		
• Continuous Assessment Tests (CAT) (At least three tests) *	15 Marks	
• Submission of duly certified practical record	10 Marks	
Total	25 Marks	
Section II: End Semester Examination (Internal only)		
• Exercise 1	20 Marks	
• Viva-Voce (internal)	05 Marks	
Total	25 Marks	
Total (Section I And II)	50 Marks	

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Skill Enhancement Course SEC
117241 Forensic Photography Lab 19

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117241	Forensic Photography Lab 19	2	60	4 Hrs	50

Course Objectives:	The intended objectives are: - To understands the fundamentals and principles of photography. - To develop skills in handling cameras and photographic equipment. - To study the role of photography in crime scene investigation. - To learn scientific methods of evidence documentation through photography. - To understand digital imaging, videography, and image processing techniques. - To study special forensic photography methods such as UV, IR, and macro photography. - To understand legal and ethical aspects related to forensic photography. - To develop practical skills in forensic documentation and report preparation	
Course Outcomes:	Upon successful completion of this course, students will be able to: - Understand the basics of photography and camera operation. - Apply photographic techniques in forensic investigations. - Capture and document crime scenes systematically. - Use digital photography and imaging software for forensic purposes. - Analyze and preserve photographic evidence properly. - Perform specialized photography techniques used in forensic science. - Prepare photographic records suitable for legal proceedings. - Demonstrate practical skills in forensic photography and documentation.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	- Introduction to Forensic Photography - Camera and Equipment Handling. - Crime Scene Photography. - Photography of Physical Evidence - Specialized Forensic Photography	To enhance student engagement and learning outcomes, the following pedagogical approaches will be incorporated: Experiential Learning (Hands-on Laboratory Work) - Conduct guided experiments on the synthesis of industrially relevant organic compounds. - Perform extractions and isolations of natural products to develop technical proficiency. Inquiry-Based Learning - Encourage students to analyse reaction mechanisms and predict product yields. - Promote critical thinking by comparing conventional and green synthesis approaches. Collaborative Learning - Facilitate group-based experimental work to enhance teamwork and problem-solving skills. - Conduct peer discussions on challenges and improvements in experimental procedures. Technology-Enhanced Learning:Use digital tools (e.g., molecular modeling software, virtual labs) to visualize reaction pathways. Case-Based and Problem-Solving Approach
Exercise/ Experiments	(At least 8) - Dentification of camera parts and accessories. - Handling and operation of DSLR/digital camera. - Study of aperture, shutter speed, and ISO settings. - Indoor and outdoor crime scene photography. - Overall, mid-range, and close-up evidence photography. - Photography of fingerprints and footprints. - Macro photography of small forensic evidence. - UV and IR photography demonstration. - Videography and photographic sequencing. - Preparation of photographic documentation report. - Digital image enhancement and processing. - Review of case studies involving forensic photography.	

Activities	Activity 1: Identification of Camera Parts Activity 2: Camera Handling Practice Activity 3: Indoor and outdoor Photography Activity 4: Macro Photography Activity 5: Evidence Photography with Scale Activity 6: UV and Infrared Photography Demonstration	a. Analyze industrial case studies related to pharmaceutical synthesis and natural product extraction. b. Discuss challenges in large-scale production and sustainability in chemical industries. • Assessment through Reflective Learning a. Encourage students to maintain lab journals for recording observations and interpretations. b. Conduct oral presentations and report writing to develop scientific communication skills.
References	References: 1. Crime scene photography- Edward M. Robinson 2. PRACTICAL Crime scene processing and investigation- Ross M. Gardner 3. Forensic Photography- Clifford E. Savage Web source: 1. https://www.nist.gov/ 2. https://crime-scene-investigator.net/ 3. https://nij.ojp.gov/ 4. https://forensicsciencesimplified.org	
Model questions	NA	

Distribution of Marks and the scheme of (SEC) Practical Examination is as follows:

Section I: Continuous Internal Assessment		
• Continuous Assessment Tests (CAT) (At least three tests) *	15 Marks	
• Submission of duly certified practical record	10 Marks	
Total	25 Marks	
Section II: End Semester Examination (Internal only)		
• Exercise 1	20 Marks	
• Viva-Voce (internal)	05 Marks	
Total	25 Marks	
Total (Section I And II)	50 Marks	
*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations		

117242 Forensic Lab- 20 (FP/CEP in Forensic Science - III)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	117242	Forensic Lab- 20 (FP/CEP in Forensic Science - III)	2	60	--	50
Course Objectives:		The intended objectives are: • To develop an appreciation of rural culture, lifestyle and wisdom amongst students. • To learn about the status of various agricultural and development programmes. • To understand the causes of distress and poverty faced by vulnerable households and explore solutions for the same. • To apply classroom knowledge of courses to field realities and thereby improve the quality of learning.					
Course Outcomes:		Upon successful completion of this course, students will be able to: 1. Conduct preliminary and detailed crime scene surveys using scientific search methods like grid, spiral, and zone search. 2. Document crime scenes through photography, videography, sketching, and note-taking as per ISO 21043 and DFSS guidelines. 3. Collect, pack, label, and seal different types of physical, biological, and digital evidence while maintaining chain of custody. 4. Assist in reconstruction of events using bloodstain patterns, trajectory analysis, and other physical evidence interpretations. 5. Prepare field project reports and case diaries integrating observations, evidence logs, and preliminary examination results. 6. Demonstrate understanding of contamination control, PPE usage, and biosafety during handling of hazardous crime scenes. 7. Interface with IOs, FSL scientists, and medico-legal experts to understand evidentiary value and legal admissibility of evidence. 8. Identify gaps between classroom learning and field practices, and propose solutions for improved evidence management. 9. Follow professional ethics, confidentiality, and victim-sensitive approaches during field exposure to real cases. 10. Present findings through seminar, poster, or dissertation with proper citations, statistical analysis, and court-oriented conclusions.					
Guidelines/ SoP for FP/CEP For understanding key principles of CE, forms of CE, operational guidelines and implementation strategy please refer https://www.ugc.gov.in/pdfnews/4187860_Revised-Final-Guidelines.pdf As per NEP 2020, students of B Sc. III of Semester V need to perform a Field Project (FP) for TWO (2) credits i.e. 50 Marks. The guidelines regarding the field project are as follows: 1) The total time allocation for the student to carry out field project is 60 hours. 2) Students should participate in field-based projects under the supervision of faculty. 3) Assignment of project topics to individual students or groups of students (max 4 students in one group) and one faculty member from the department will act as Guide for the student or group of students. 4) For a SURVEY based project related questionnaire (15 or more questions) should be prepared. 5) The departmental coordinator/guide should check the questions and finalize the questionnaire. The question that may create unnecessary complications should be avoided. The questions should be qualitative as well as quantitative. 6) If the project is related to work that does not involve survey work, then the questionnaire part can be replaced accordingly (e.g. Sample collection/Data collection/ Experimental base etc). 7) The student should compile all the relevant data and carry out its analysis. 8) A project report should be written individually in the standard format (2 Copies): Index, Introduction, Materials, Methods, Result, Conclusion/output, References (Numeric citation type) etc. 9) The project report should be of minimum 6 pages (excluding Title page, Certificate, Index, Acknowledgement etc.). Submit the project report with the Guide’s signature to the department. 10) The oral /poster presentation for all the projects should be arranged in the department. To evaluate the project, examiner should be appointed by HoD. 11) The total project work including preparation of questionnaire to presentation should be evaluated for 2 credits (50 Marks). Some suggested forms of FP/ CEP are: 1. Linking forensic learning with community safety: Students of Forensic Science can conduct awareness programs on cybercrime, drug abuse, road safety,							

fingerprint identification, and basic crime prevention measures in schools and local communities.

2. Linking forensic research with societal issues:

Students can undertake community-based research projects on topics such as cyber fraud trends, substance abuse patterns, environmental pollution, domestic violence awareness, or digital safety practices in collaboration with local agencies or NGOs.

3. Knowledge sharing and forensic awareness activities:

These may include surveys, awareness campaigns, exhibitions, training sessions, mock crime scene demonstrations, legal literacy drives, self-defense awareness, and workshops on evidence preservation and emergency response.

4. Forensic support for social and legal awareness:

Students may participate in activities related to victim support awareness, child safety campaigns, women safety initiatives, anti-ragging drives, traffic rule awareness, and dissemination of knowledge regarding forensic applications in justice delivery.

5. Social innovations and technology-based forensic initiatives:

Students can develop innovative projects such as mobile awareness applications for cyber safety, digital evidence management ideas, forensic educational models, crime mapping studies, or low-cost forensic kits for academic and community use.

A few suggested (not exclusive) areas which not only provide practical applications of chemistry concepts but also foster collaboration, education, and sustainable practices within the community. are:

1. Create awareness about cybercrime, online frauds, phishing attacks, and digital safety practices among school and college students.
2. Enhance forensic science literacy among students through interactive demonstrations of fingerprint analysis, crime scene investigation, and forensic techniques.
3. Conduct surveys and awareness drives on drug abuse, alcohol addiction, and substance misuse within local communities.
4. Study and document the pattern of road accidents in local areas and suggest preventive and safety measures.
5. Identify and create awareness regarding environmental crimes such as illegal waste disposal, water contamination, and wildlife trafficking.
6. Implement community programs on women and child safety, self-defense awareness, and legal rights education.
7. Promote awareness regarding the safe handling, storage, and disposal of hazardous household chemicals and medicines.
8. Assess local public places for safety measures such as CCTV surveillance, emergency response systems, and fire safety preparedness.
9. Conduct mock crime scene investigations and educate the public about evidence preservation and the role of forensic science in justice delivery.
10. Assist schools and communities in understanding cyber hygiene, password security, digital footprints, and responsible social media usage.
11. Undertake projects related to forensic photography, documentation, and mapping of accident-prone or crime-prone areas for community awareness.
12. Study the impact of fake news, misinformation, and online scams on society and develop awareness campaigns for prevention.

References	1. https://www.ugc.gov.in/pdfnews/4187860_Revised-Final-Guidelines.pdf 2. https://en.wikipedia.org/wiki/OU_Citizen_Science_Soil_Collection_Program 3. https://www.immerse.education/study-tips/100-ideas-for-research-projects-in-chemistry/ 4. https://pubs.rsc.org/en/content/articlelanding/2021/rp/d0rp00374c 5. https://www.acs.org/education/student-communities/activities.html 6. https://www.nettercenter.upenn.edu/academically-based-community-service-chemistry-outreach
Model Questions:	NA

Distribution of Marks and the scheme of FP/CEP Examination is as follows:

- | | |
|--|----------|
| • Students' performance | 20 Marks |
| • Submission of duly certified FP/CEP report | 20 Marks |
| • Presentation (PPT or Poster) | 10 Marks |

Total

50 Marks

Course Category: Non-Credit
Foundation of Artificial Intelligence

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V		Foundation of Artificial Intelligence	Non credit	30	2 Hrs	30+20=50

Introduction :

The National Education Policy (NEP) 2020 emphasizes the integration of Artificial Intelligence (AI) across all undergraduate levels and disciplines to foster digital literacy and problem-solving skills. 'It can enhance the employability of the youth and prepare professionals in cutting-edge areas.' (pg. 46, R.D Kulkarni Report)

The Foundations of Artificial Intelligence course offers an overview of the key concepts, structures, applications, and ethical aspects of AI. It helps learners understand how intelligent systems work and shape modern life. The course covers AI's definition, evolution, types, and practical uses, along with its basic architectures like rule-based systems, machine learning, and neural networks. Learners will explore AI's role in education, healthcare, and commerce while reflecting on ethical and social concerns such as privacy, bias, and automation. In line with NEP 2020, it fosters digital literacy and responsible AI awareness for all disciplines.

A) Objective

- i) Introduce all undergraduate students of all the faculties to the basic concepts, uses, and importance of AI.
- ii) Enable learners to understand AI's principles, applications, limitations, and effectively use AI tools.
- iii) Encourage students to recognize AI's role in enhancing life and engage with its social and ethical implications.

B) Outcomes

- i) Understand the fundamental concepts, types, and evolution of Artificial Intelligence.
- ii) Apply basic AI techniques and tools to real-world problems across different domains.
- iv) Evaluate the social, ethical, and professional implications of AI in everyday life.

C) Implementation of Syllabus, Scheme of Examination and Teaching.

- 1) Curriculum, Teaching and Examination Scheme Given in Appendix A
- 2) This course given in Appendix A shall be compulsory course in **fifth semester** of all undergraduate programs of all faculties in Sant Gadge Baba Amravati University, Amravati.
- 2) Medium of instruction, paper setting and writing of Answer paper shall be in English, Marathi and Hindi.
- 3) Question paper shall be set and valued by the College/ Department.
- 4) Duration of external examination shall be of 2 hours and paper shall be of 30 marks.
- 5) Internal 20 marks shall be distributed, 5 to attendance, 15 marks to assignment/class test/viva voce/presentation.
- 6) Distribution of 30 external marks shall be based on 4 units, 15 marks to short and 15 marks to long answer type questions.
- 7) It shall be obligatory on part of the college/department to conduct examination on prescribed date by the university and submit the candidate wise information as follows on university portal on due date after valuation answer books.
Grade A -- mark secured 30 to 50,
Grade B -- 25 to 29,
Grade C -- 20 to 24,
FAIL 19 and below
- 8) The final Grade shall be determined by the combined performance in internal and external assessments. A student must secure a minimum of 30% in the internal assessment, 30% in the external assessment, and at least 40% overall to pass. Failure to meet any of these criteria will result in a grade of "Fail."
- 9) In case of failure, student need to appeared in backlog examination by paying prescribed fees.
- 10) Valuated answer book shall be kept in college custody for one academic year and random verification may be done by the University if required.

11) Result of final year of respective degree shall not be declared of an examination unless secured any of the grades out of A to C in Foundation of Artificial intelligence.

12) Grade secured by an examinee in examination of said course shall be shown on fifth and last semester marksheet.

13) The candidates shall have to pay Rs 150 /- in 5th semester to the college to meet out the expenses by the college on teaching of course, question paper setting and printing, paper valuation, providing answer sheet, and filling grade on University portal. In case of failure student need to pay Rs 20 /- for conduction of examination. There shall not have any facility of revaluation of answer book.

14) For teaching of the subject person having PG degree in any faculty with second class shall be considered eligible, provided priority shall be given to Ph.D., NET, SET, regular teacher.

15) Format of question paper

Distribution of 30 external marks shall be based on 4 units, 15 marks to short and 15 marks to long answer type questions with internal choice.

1a) Long or short answer questions based on unit number 1 having 8 marks

Or

1b) Long or short answer questions based on unit number 1 having 8 marks

2a) Long or short answer questions based on unit number 2 having 7 marks

Or

2b) Long or short answer questions based on unit number 2 having 7 marks

3a) Long or short answer questions based on unit number 3 having 8 marks

Or

3b) Long or short answer questions based on unit number 3 having 7 marks

4a) Long or short answer questions based on unit number 4 having 8 marks

Or

4b) Long or short answer questions based on unit number 4 having 8 marks

Program:				Semester:	V	
Course: Foundation of Artificial Intelligence				Code:		
Teaching Scheme				Evaluation Scheme		
Level	Lecture	Hours	Credit	Internal	External	Total
5.5	2	2	2	20	30	50
Methods of Internal Assessment: 15 Marks to Class Tests, /Assignments/ Viva voce/ Presentation & 5 Marks to Attendance						
Course Objectives: To introduce AI concepts in a simple, real-life way with focus on understanding applications, ethics, and future opportunities.						
Course Outcomes: After completion of the course, the students will be able to:						
CO	Course Outcomes				BT Level	
CO-1	Explain the basic concepts, history, and types of AI with real-life examples.				L1 – Knowledge, L2 – Understanding	
CO-2	Describe AI structures and architectures using simple real-world analogies.				L2 – Understanding, L3 – Application	
CO-3	Identify and analyze applications of AI in the area of arts, commerce, humanities, and daily life.				L3 – Application, L4 – Analysis	
CO-4	Evaluate ethical, social issues and predict future opportunities of AI in their own fields.				L4 – Analysis, L5 – Evaluation	

Unit 1: Introduction to Artificial Intelligence (8 Hours)

Definition of AI: What is Intelligence? Natural vs. Artificial, Simple definition of AI; History & Evolution of AI: From early computers to modern AI; Types of AI: Narrow AI vs. General AI vs. Super AI; AI in Everyday Life: Google Maps, E-commerce suggestions, Chatbots, Social Media feeds; Key Components: Data, Algorithms, Computing Power

Unit 2: AI Structures, Architectures & Techniques (7 Hours)

Basic Structure of an AI System; AI Architectures (Simplified): Rule Based System, Machine Learning, Neural Networks; Key Concepts: Knowledge Representation (using symbols, facts), Search & Problem Solving (maze example, finding shortest route), Natural Language Understanding (Google Translate, chatbots)

Unit 3: Applications of AI in Society (7 Hours)

AI in Different Fields: Education (Personalized learning apps, plagiarism checkers), Healthcare (Disease prediction, medical chatbots), Commerce (Fraud detection in banking, stock market predictions, customer support), Daily Life (Smart home devices, language translation, travel assistants); AI & Decision Making: Hiring, Loan Approval, Court Decisions; Advantages of AI, Limitations of AI

Unit 4: Ethical, Social & Future Aspects of AI (8 Hours)

Ethical Concerns in AI: Privacy issues (CCTV, online data), Bias & Fairness (AI preferring certain groups), Job Displacement (automation replacing humans); Responsible AI: Transparency, Accountability, Human oversight; Future Trends in AI: Self-driving cars, AI in governance, creative industries; AI and You (Career Perspective): Opportunities in Digital Marketing, Content Creation, Business Analytics, HR Tech, Creative Industries (non-programming roles)

Textbook:

Melanie Mitchell – *Artificial Intelligence: A Guide for Thinking Humans*

Reference Books:

1. Boden, Margaret A., *Artificial Intelligence: A Very Short Introduction*
2. Elaine Rich – *Artificial Intelligence* (3rd Edition)
3. Godbole, Achyut, *Artificial Intelligence* (आर्टिफिशियल इंटेलिजन्स), Bookganga Publication.
4. Kulkarni, Dr Anand, आर्टिफिशियल इंटेलिजन्सचा वाटेवर, Sakal Media Pvt. Ltd.
5. Stuart Russell – *Human Compatible* (2019)
6. Thorpe, Josh, *AI for Students: Creative Hacks for Academic Success*, Promply Books

Course Category: **Major (Theory)**

117243 Basics of ICT

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117243	Basics of ICT	2	30	2 Hrs.	30+20=50
Course Objectives:		Learn techniques for detecting unauthorized access and digital fraud. Develop skills in investigating cyber incidents and cyber attacks Understand email, social media, and internet-related investigations. Identify different types of cybercrimes such as: Hacking, Phishing, Identity theft, Cyber stalking, Online fraud, Malware attacks					
Course Outcomes:		After successful completion of the course, a student will be able to- Understand the processes of computer forensics, including topics within digital forensics and computer crimes. Acquire knowledge how digital evidence plays in criminal and civil investigations and incident response Identify, gather evidences and preserve the proof of a law-breaking. Understand the Cyber and Computer Crimes.					
Unit	Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to ICT Meaning and scope of ICT, Importance of ICT in daily life, education, business, and communication. Basic computer organization: hardware, software, Input, output, storage devices. Evolution of computers and their characteristics, types Basics of computer architecture and storage devices.			7 Hrs.	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions:	
Unit II	Operating System and Basic Applications Operating systems overview: Windows, Linux, and mobile devices. Functions of an OS: file and memory management, processing and security File, folder, directory concepts: naming, extensions, hierarchical structure, Registry, logs, memory, and disk artifacts. Introduction to file recovery and forensic examination of systems			8 Hrs.	8 Marks	Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions.	
Unit III	Internet and Communication Tools Concept of Internet, intranet, and World Wide Web; Network types, topologies How the internet works: servers, clients, IP address and domain names, Need for data security, backups and privacy in digital environments Web browsers, URLs, search engines, web pages Email basics (structure, attachments, spam)			7 Hrs.	7 Marks	Ask students to create concept maps that illustrate the relationships between different concepts.	
Unit IV	Cyber and Computer Crimes Definition and types of cyber-crimes: Internal and External Attacks; Introduction to internet crimes: hacking and cracking, computer stalking, credit card and ATM frauds, phishing, identity theft, data theft, steganography; Crimes related to social media: cyber defamation; Types of computer crimes: cyber pornography, computer terrorism, hate speech, Malicious codes			8 Hrs.	8 Marks	Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.	

References:	1. Joshi, R. (2006). Introduction to computers. Gyan Publishing House. 2. Venkatachalam, S. (1996). Introduction to computers. Pitambar Publishing House. 3. P.K. Singh. (2015). Basics of Computer. V.K. Publications 4. Miller, M. (2016). Computer basics: (10th ed.). Que. 5. Joshi, R. C. (2005). Operating systems: A simplified methodological approach. Dream tech Press. 6. Odom, W. (2004). Computer Networking first-step. Macmillan Computer Pub. 7. Bagad, V. S., & Dhotre, I. A. (2010). Data Communication and Networking. Technical Publications. 8. Beasley, J. S., & Nilkaew, P. (2012). Networking essentials. Pearson Education. 9. Gerdes, L. I. (2009). Cybercrime. Green haven Press. 10. Moore, R. (2015). Cybercrime: Investigating high-technology computer crime. Routledge Taylor & Francis Group. 11. J., M. J. A., & Menendez, D. (2008). Cyber forensics: A Field Manual for collecting, examining, and preserving evidence of computer crimes. Auerbach Publications. 12. Casey, E. (2004). Digital Evidence and Computer Crime: Forensic Science, Computers and the internet. Academic Web Resources 1. https://cybercrime.gov.in/?utm 2. https://www.cert-in.org.in/?utm 3. https://www.cisa.gov/topics/cybersecurity-best-practices 4. https://www.interpol.int/Crimes/Cybercrime?utm
Model Questions:	Short Type (At least 6) (1 Marks each) 1) Short Type (At least 6) (1 Marks each) 2) What is ICT? 3) Give examples of input devices. 4) Give examples of output devices. 1) . What is computer forensics? 5) 6) What is an email application? 7) What is spreadsheet software?
	Answer in brief (At least 6) (3 Marks each) 2) Explain Internet? 3) Explain with suitable example social media communication? 4) Explain cybercrime? 5) State any two uses of basic computer applications 6) What is mobile forensics?
	Answer in Detail (At least 4) (6 Marks each) 1) Explain in detail phishing? 2) Explain with example malware? 3) What is metadata? Explain. 4) What is the role of the Internet in forensic investigation? 5) Explain two communication tools used in forensic investigation.
	MCQs for Internal Assessment (At least 4) 1 Cyber forensics is also known as: A) Medical forensics B) Digital forensics C) Ballistic forensics D) Chemical forensics Answer: B) Digital forensics 2. Which of the following is considered digital evidence? A) Fingerprints B) Blood samples C) Emails D) Hair samples Answer: C) Emails 3. The process of recovering deleted files is called: A) Data mining B) Data recovery C) Data cleaning D) Data coding Answer: B) Data recovery 4. Which tool is commonly used in cyber forensics? A) Microscope B) Autopsy C) Thermometer D) Spectrometer

	Answer: B) Autopsy 5. Phishing is a type of: A) Physical attack B) Online fraud C) Biometric test D) Networking protocol Answer: B) Online fraud 6. Malware is: A) Hardware device B) Protective software C) Malicious software D) Communication software Answer: C) Malicious software 7. Which of the following helps protect a computer from unauthorized access? A) Firewall B) Printer C) Scanner D) Speaker Answer: A) Firewall
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Course Category: **Major (Theory)**
117244 Digital and Cyber Forensics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117244	Digital and Cyber Forensics	2	30	2 Hrs	30+20=50

Course Objectives:	Students will familiarize about 1. To understand underlying principles and many of the techniques associated with the digital forensic practices and cyber crime 2. To explore practical knowledge about digital forensic methodology. 3. To learn the importance of evidence handling and storage for various devices 4. To develop an excellent understanding of current cyber security issues and analyzed the ways that exploits in securities.			
Course Outcomes:	After successful completion of the course, a student will be able to- 1. Describe Forensic science and Digital Forensic concepts 2. Determine various digital forensic Operandi and motive behind cyber attacks 3. Interpret the cyber pieces of evidence, Digital forensic process model and their legal perspective. 4. Demonstrate various forensic tools to investigate the cybercrime and to identify the digital pieces of evidence 5. Analyze the digital evidence used to commit cyber offences.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Cyber Crime and Digital Forensics Meaning, scope, and importance of cyber and digital forensics. Digital evidence: meaning, characteristics, and importance. Fundamentals of evidence preservation, chain of custody, and documentation. Professional responsibilities, ethics, and legal admissibility of digital evidence.	8 Hrs.	8 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
Unit II	Biometrics and Digital Evidence Introduction to biometrics and its role in forensics. Fingerprints, face recognition, iris, voice, and gait basics. Biometric data storage, matching, and security issues. Use of biometrics in access control, identification, and investigation.	7 Hrs.	7 Marks	
Unit III	Network, Internet, and Incident Response Network traffic analysis and packet basics. Web attacks, email investigation, and browser artifacts. Incident response: preparation, detection, containment, eradication, recovery, and reporting. Tools for analysis: disk imaging tools, file recovery tools, browser history viewers, log analyzers, hash tools, and basic network monitoring tools.	8 Hrs.	8 Marks	
Unit IV	Cyber Law, Complaint Portals, and Data Security IT Act basics: key cyber offences and penalties. Common crimes and legal provisions: unauthorized access, data theft, identity theft, cheating, privacy violations, cyber terrorism. Online complaint and awareness systems in India, including cybercrime reporting portals and cyber safety awareness	7 Hrs.	7 Marks	

	resources. Guidelines governing data protection, data security, privacy, and lawful handling of digital records.			
References:	1. Computer Forensics: Computer Crime Scene Investigation, Volume 1 John R. Vacca, Charles River Media 2. Advances in Digital Forensics II edited by Martin S. Olivier, Sujeet Sheno 3. Computer Forensics: Investigating File and Operating Systems, Wireless networks and storage CHFI By ECCouncil (book 2 of 4) 4. Handbook of Security, Cryptography & Digital Signature 5. Forensic Science – From the Crime Scene to the Crime Lab by Richard Saferstein 6. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill 7. Cyber Law and E. Commerce, David Baumer, J C Poindexter, TMG Cyberlaw Simplified Vivek Sood, TMG 8. e-Commerce Strategy, Technologies and Applications, David Whiteley, McGraw Hill International 9. E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi,TMG 11. 10. Firewalls and Internet Security: Repelling the Wily Hack Web resources: 1. https://www.nist.gov/itl/csd/secure-systems-and-applications/computer-forensics-tool-testing-program-cftt 2. https://www.cisa.gov/topics/cybersecurity-best-practices 3. https://www.interpol.int/Crimes/Cybercrime?utm_source=chatgpt.com 4. https://www.sans.org/digital-forensics/?utm			
Model Questions:	Short Type (At least 6) (1 Marks each) 1) Define cyber forensics. 2) Define digital forensics? 3) Define mobile forensics? 4) What is digital evidence? 5) What is a hash value?			
	Answer in brief (At least 6) (3 Marks each) 1) State any two applications of digital forensics. 2) Explain cyber terrorism? 3) What is database forensics? 4) Explain electronic evidence?			
	Answer in Detail (At least 4) (6 Marks each) 1. Explain with suitable examples ‘Cyber law’. 2. Explain in brief digital fingerprinting? 3. Explain any two digital forensic tools. 4. What is brute force attack?			
	MCQs for Internal Assessment (At least 4) 1. Digital forensics is mainly used for: a) Cooking b) Investigating digital crimes c) Painting d) Banking Answer: b) Investigating digital crimes 2. Which of the following is a type of cybercrime? a) Fishing b) Phishing c) Farming d) Mining Answer: b) Phishing 3. Which attack floods a server with traffic? a) SQL Injection b) DoS Attack c) Spyware d) Sniffing Answer: b) DoS Attack 4. Malware designed to demand payment is called: a) Worm b) Trojan c) Ransomware d) Antivirus Answer: c) Ransomware			

Course Category: **Major (Theory)**
117245 Fundamentals of Forensic ICT

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117245	Fundamentals of Forensic ICT	2	30	2 Hrs	30+20=50

Course Objectives:	To provide knowledge of: Computer systems Networking Internet technologies Information and communication systems Digital infrastructure Evidence identification Evidence acquisition						
Course Outcomes:	After successful completion of the course, a student will be able to- 1. Understand ICT infrastructure 2. Identify cybercrime methods 3. Understand digital evidence concepts 4. Understand Digital Forensic Investigation Skills 5. Legal and Ethical Understanding.						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Introduction to ICT & Cyber Forensics Basics of Information & Communication of Technology (ICT), Computer fundamentals, Operating systems, Networking basics, Internet architecture, Introduction to cybercrime, Digital evidence, Need for cyber forensics, Types of cyber attacks	7 Hrs.	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.			
Unit II	Computer & Digital Forensics Introduction to digital forensics, Digital forensic process, Identification of evidence, Preservation of evidence, Collection and acquisition, Forensic duplication/imaging, Chain of custody, Hashing techniques.	8Hrs	8 Marks				
Unit III	Network & Internet Forensics Network traffic analysis, Packet sniffing, Log analysis, IP tracing, Email investigation, Browser forensics, Wi-Fi investigation, Intrusion detection systems.	8 Hrs	8 Marks				
Unit IV	Mobile & Cloud Forensics Mobile device investigation, SIM analysis, Call detail records, WhatsApp/chat forensics, GPS tracking, Android/iOS forensics, Cloud evidence Cloud investigation challenges.	7 Hrs	7 Marks				

References:	1. Incident Response and Computer Forensics - Kevin Mandia and Chris Prosise. 2. Computer Forensics and Cyber Crime textbook by Marjie T. Britz. 3. The Basics of Digital Forensics: - John Sammons. 4. Digital Forensics is a comprehensive -Nilakshi Jain. 5. Investigating Computer Crime - Peter Stephenson 6. Incident Response & Investigation 7. Web resources: 1. https://www.nielit.gov.in/content/cyber-security-forensics-division?utm 2. https://www.nielit.gov.in/content/cyber-security-forensics-division?utm 3. https://vte.nielitcybersec.in/?utm 4. https://cybercrime.gov.in/?utm
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Name any two operating systems. 2. Define authentication. 3. Define Digital Evidence. 4. What is meant by cyberspace? 5. What is data encryption? 6. What is a password? Answer in brief (At least 6) (3 Marks each) 1.Explain in brief biometric system. 2. Define mobile forensic and explain its importance. 3. Write a short note on SIM card forensics. 4. write a short on cybercrime investigation through internet evidence. 5. Write a short note on firewall logs. 6. Write a short note on cybercrime investigation through Internet evidence. Answer in Detail (At least 4) (6 Marks each) 1) Explain the importance of chain of custody in forensic evidence handling. 2) Explain the role of mobile application in forensic investigation. 3) Explain the importance of cyber security in protecting network data. 4) Explain how IP addresses help in tracing cybercriminals. MCQs for Internal Assessment (At least 4) 1. What does IP stand for? a) Internet Process b) Internet Protocol c) Internal Protocol d) Information Protocol Answer: b) Internet Protocol 2. Which device connects multiple networks together? a) Switch b) Hub c) Router d) Modem Answer: c) Router 3. Which cybercrime involves sending fake emails to users? a) Spamming b) Phishing c) Hacking d) Cracking Answer: b) Phishing 4. Which of the following helps prevent cybercrime? a) Strong passwords b) Antivirus software c) Firewalls d) All of the above Answer: d) All of the above

Course Category: **Major Lab**
117246 Cyber and ICT Forensics Lab 21

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117246	Cyber and ICT Forensics Lab 21	2	60	4 h	25+25= 50

Course Objectives:	Students learn evidence identification procedures. Students learn evidence preservation techniques. Students learn file recovery techniques. Students learn web activity analysis. Students learn password recovery concepts. Students learn network forensics and intrusion analysis.	
Course Outcomes:	At the end of this course students will be able to: 1. understand network communication basics. 2. gain basic system investigation skills. 3. Understand data recovery methods. 4. understand browser forensics.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	1. Explain the objectives of a cyber forensics lab. 2. Explain the difference between cyber forensics and traditional forensics. 3. Explain how cyber forensic laboratories help law enforcement agencies	• By combining hands-on experiments, discussions, and real-world applications, students will gain a comprehensive understanding of Cyber Forensic lab practices. A few suggested pedagogies are: • Students should be given suitable pre- and post-lab assignments and explanation revising the theoretical aspects of laboratory experiments prior to and after the conduct of each experiment. • Hands-On Laboratory Sessions: Provide regular hands-on laboratory sessions where students can directly apply theoretical knowledge to practical experiments. • Demonstrations and Simulations: Use virtual simulations for certain experiments to enhance accessibility and understanding. • Flipped Classroom Model: Encourage students to come to class prepared, promoting active participation. • Interactive Workshops: Provide opportunities for students to engage in discussions, ask questions, and seek clarification. • Technology Integration: Incorporate digital tools for data analysis and presentation. • Guest Lectures and Industry Connections: Establish connections with professionals in the field to provide students with a broader perspective on chemical lab practices. • Inquiry-Based Learning: Explore topics through questioning, investigation, and research. • Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge
Cyber Forensics practical	1. To identify potential digital evidence from computer systems 2. To create a forensic image of storage media. 3. To recover deleted files from storage media. 4. To investigate internet activity 5. To investigate suspicious emails. 6. To understand password security and forensic recovery. 7. To analyze network traffic. 8. To trace network activities.	
ICT Forensics Practical	1. To identify ICT hardware used in forensic investigations. 2. To study operating systems used in forensic computing. 3. To understand computer networking fundamentals. 4. To identify potential digital evidence. 5. To create forensic images of storage devices 6. To recover deleted digital evidence. 7. To analyze internet usage traces. 8. To understand password vulnerabilities.	

References	1. Guide to Computer Forensics and Investigations - Bill Nelson, Amelia Phillips, 2. Digital Evidence and Computer Crime - Eoghan Casey. 3. Computer Forensics and Cyber Crime - Marjie T. Britz. 4. Practical Digital Forensics - Akashdeep Bhardwaj and Keshav Kaushik 5. Digital Forensics, Investigation, and Response - Chuck Easttom. 6. Cyber Forensics - Nandan Kamath. 7. Information Security and Cyber Laws - Surya Prakash Tripathi 8. Cyber Crime Investigation and Digital Forensics - Nishant Singh Web Resources: 1. https://www.cert-in.org.in 2. https://cybercrime.gov.in 3. https://www.meity.gov.in 4. https://www.nist.gov 5. https://www.forensicfocus.com
Model Questions:	NA

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

- | | |
|--|-----------------|
| • Active participation in activities | 10 Marks |
| • Continuous Assessment Tests (CAT) (At least three tests) * | 10 Marks |
| • Submission of duly certified practical record | 05 Marks |
| Total | 25 Marks |

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

- | | |
|--|-----------------|
| • Exercise 1 (Organic Chem Practical) | 10 Marks |
| • Exercise 2 (Physical Chem Practical) | 10 Marks |
| • Viva-Voce (external) | 05 Marks |
| Total | 25 Marks |

Course Category: **Major- Elective (Theory)**
117247 Forensic Accounting and Auditing

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117247	Forensic Accounting and Auditing	2	30	2 Hrs	30+20=50

Course Objectives:	1. To detect and prevent financial frauds 2. To investigate financial crimes 3. To collect and analyze financial evidence 4. To support legal proceedings with expert reports 5. To ensure transparency and accountability in organizations 6. To identify money laundering and cyber financial crimes			
Course Outcomes:	After successful completion of the course, a student will be able to- Understand financial frauds, cybercrimes, and corporate scams. By combining accounting knowledge with investigative skills.			
Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Forensic Accounting Application of accounting, principles and investigative techniques, Fraud Embezzlement, Money laundering, Ethics, professionalism, and legal responsibilities, financial disputes or frauds. Evidence-oriented approach. Legally acceptable reporting. Focuses on fraud detection, data analysis and digital investigation.	7Hrs	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
Unit II	Fraud Detection and Investigation Fraud triangle and fraud risk indicators. Common frauds: asset misappropriation, corruption, financial statement fraud. Red flags in accounting records and audit reports. Basics of investigative techniques. Collection, preservation, and evaluation of evidence.	7 Hrs	7 Marks	
Unit III	Forensic Auditing Process Definition and objectives of auditing, Types of audits: Internal audit, External audit Methods of fraud detection: Document examination, Transaction analysis Introduction to financial statements: Balance sheet, Income statement, identifying irregularities, Documentation, working papers, and report preparation.	8 Hrs	8 Marks	
Unit IV	Legal Aspects & Case Studies Types of fraud: Corporate fraud, Banking fraud, Insurance fraud, Fraud prevention and detection controls. Role of technology, data analytics, and digital tools in forensic accounting, Case studies: Corporate scams, Banking fraud cases.	7 Hrs	7 Marks	
References:	1. Forensic Accounting and Fraud Detection – Dr. S. Ramanathan 2. Forensic Accounting and Auditing – Dr. Prakash Lokhande 3. Forensic Accounting – Dr. N.K. Jain			

	- Forensic Accounting and Corporate Fraud – B.K. Mehta - Principles of Auditing and Forensic Accounting – Tulsian & Tulsian - Forensic Accounting and Investigation Standards in India – CA Kamal Garg - Auditing and Assurance with Forensic Accounting – Surbhi Bansal - Auditing and Assurance Services - Alvin A. Arens - Contemporary Auditing – Contemporary Auditing by Michael C. Knapp - Auditing Theory and Practice – Auditing Theory and Practice by Tandon Web resources: https://www.acfe.com/?utm_ https://forensicasia.org/resources/ https://abfa.us/resources/ https://www.icaai.org/ https://samaaudit.com/ https://libguides.snhu.edu/forensic_accounting https://njfafi.nfsu.ac.in/
Model Questions:	Short Type (At least 6) (1 Marks each) - Define forensic accounting. - What is forensic auditing? - What is financial fraud? - Expand AML. - What is money laundering? - Define cyber fraud. - What is audit evidence? - What is digital evidence?
	Answer in brief (At least 6) (3 Marks each) - Explain the objectives of forensic accounting. - Differentiate between auditing and forensic auditing. - Explain the role of forensic accountants in fraud detection. - Describe the Fraud Triangle theory. - Explain the importance of audit evidence. - Discuss the role of internal control in fraud prevention. - Explain the concept of digital evidence. - Describe the techniques used in fraud investigation. - Explain cyber frauds in financial systems. - Write a short note on money laundering. - Explain the importance of forensic data analytics. - Describe the role of technology in forensic accounting. - Explain audit working papers and their importance. - Discuss professional ethics in forensic auditing. - Explain the importance of corporate governance in fraud prevention.
	Answer in Detail (At least 4) (6 Marks each) - Define forensic accounting and explain its scope and objectives. - Discuss various types of financial frauds and methods of detection. - Explain the role of forensic auditing in preventing corporate frauds. - Describe the process of forensic investigation in detail. - Explain the importance of digital evidence and cyber forensics in accounting investigations. - Discuss the role of forensic accountants in legal proceedings. - Explain money laundering and anti-money laundering measures. - Discuss the importance of internal control systems in fraud prevention. - Explain various cybercrimes affecting accounting and financial systems. - Discuss the use of data analytics and artificial intelligence in forensic accounting.
	MCQs for Internal Assessment (At least 4) - Forensic accounting is mainly concerned with: - Marketing - Fraud investigation - Production - Human resources Answer: b) Fraud investigation - Which theory explains the causes of fraud? - Fraud Triangle - Demand Theory - Utility Theory - Market Theory Answer: a) Fraud Triangle - Which of the following is a cyber financial crime?

	a) Phishing b) Hacking c) Identity theft d) All of the above Answer: d) All of the above 4. Audit evidence is collected to: a) Reduce taxes b) Support audit conclusions c) Increase sales d) Improve production Answer: b) Support audit conclusions 5. Money laundering means: a) Legal banking b) Converting illegal money into legal money c) Tax planning d) Budget preparation Answer: b) Converting illegal money into legal money 6. Which technology is widely used in forensic accounting? a) Data analytics b) Animation software c) Gaming tools d) Graphic designing Answer: a) Data analytics 7. Which is an example of digital evidence? a) Emails b) Transaction logs c) Computer files d) All of the above Answer: d) All of the above 8. Internal controls help organizations to: a) Increase fraud b) Prevent fraud c) Avoid accounting d) Reduce auditing Answer: b) Prevent fraud 9. Which Indian law deals with cybercrime? a) IT Act 2000 b) Companies Act c) Banking Act d) Factory Act Answer: a) IT Act 2000
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Course Category: Major Elective Lab
117248 Forensic Accounting Lab 22A

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117248	Forensic Accounting Lab 22A	2	60	4 h	25+25= 50

Course Objectives:	1. To familiarize students with forensic auditing tools, software, and investigative procedures. 2. To develop skills in detecting, analyzing, and preventing financial frauds. 3. To develop analytical and critical thinking skills required for forensic examination and fraud detection. 4. To prepare students for careers in forensic accounting, auditing, fraud examination, compliance, and financial investigation.	
Course Outcomes:	1. Upon successful completion of this course, students will be able to: 2. Understand the concepts, principles, and scope of forensic accounting and forensic auditing. 3. Identify and analyze various types of financial frauds and cyber-enabled financial crimes. 4. Apply forensic accounting techniques for fraud detection, investigation, and prevention. 5. Examine financial statements and accounting records to identify irregularities and suspicious transactions. 6. Collect, preserve, and analyze financial and digital evidence using appropriate forensic procedures. 7. Use forensic auditing tools, data analytics techniques, and digital investigation methods effectively.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	1. Describe the scope of forensic accounting in modern organizations. 2. What is financial fraud? Explain its major types. 3. Explain the Fraud Triangle theory. 4. Describe the techniques used in fraud investigation. 5. Explain the importance of audit evidence in forensic investigations. 6. What is digital evidence? Explain its significance. 7. Describe the process of collecting and preserving forensic evidence. 8. Explain cyber frauds in accounting systems.	• Experiential Learning: Conduct fraud investigation simulations Analyze real financial statements and audit reports Practice digital evidence collection and analysis Perform bank reconciliation and fraud detection exercises Real-life fraud cases are discussed and analyzed, reinforce theoretical concepts. • Inquiry-Based Learning: Students investigate financial irregularities independently. Students work on mini projects and investigation assignments. Analysis of cyber fraud trends. Internal control evaluation. Financial statement fraud detection. Encourages independent learning. Promotes research skills. Improves report-writing abilities • Collaborative Learning: Group-based Fraud risk assessment of an organization. Students solve simulated fraud and audit problems. Group fraud analysis, Team presentations, Collaborative case discussions, Peer review of reports. • Technology-Enhanced Learning: Use of Information and Communication Technology tools. Microsoft Excel, Power BI, Tally ERP, Audit analytics software, online forensic resources, promotes digital literacy, enhances technical competency, Supports data-driven investigation. Improves teamwork, develops communication skills, Encourages peer learning • Reflective and Analytical Learning: Use forensic tools and technologies, Investigate cyber-enabled financial
Forensic Accounting Lab Practicals	1. To identify financial irregularities through statement analysis. 2. To prepare audit documentation and evidence records. 3. Email and Transaction Analysis: To examine suspicious communications and transactions. 4. Bank Reconciliation Investigation: To detect irregularities in bank reconciliation statements. 5. Money Laundering Case Analysis: To identify stages of money laundering. 6. Forensic Data Analytics: To apply data analytics techniques in forensic accounting. 8. Case Study Analysis: To investigate simulated fraud cases.	

		crimes Maintaining laboratory records supports systematic documentation of observations, calculations, and deviations. Post-experiment discussions encourage critical evaluation and correlation of experimental results with theoretical principles and real-world applications. Any other innovative pedagogy as applicable.
References	1. Forensic Accounting and Auditing – Dr. Prakash Lokhande 2. Forensic Accounting and Fraud Detection – Dr. S. Ramanathan 3. Forensic Accounting and Investigation Standards in India – CA Kamal Garg. 4. Auditing and Assurance with Forensic Accounting – Surbhi Bansal 5. Practical Auditing – B.N. Tandon 6. Forensic Accounting and Fraud Examination by Mary-Jo Kranacher 7. Forensic Accounting by William S. Hopwood. Web Resource: 1. https://gafa.org.in/ 2. https://gafa.org.in/ai-forensic-accounting 3. https://forensicasia.org/resources/ 4. https://www.ssrn.com	
Model Questions:	NA	

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

- | | |
|--|-----------------|
| • Active participation in activities | 10 Marks |
| • Continuous Assessment Tests (CAT) (At least three tests) * | 10 Marks |
| • Submission of duly certified practical record | 05 Marks |
| Total | 25 Marks |

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

- | | |
|------------------------|-----------------|
| • Exercise 1 | 10 Marks |
| • Exercise 2 | 10 Marks |
| • Viva-Voce (external) | 05 Marks |
| Total | 25 Marks |

Course Category: **Major- Elective (Theory)**
117249 Forensic Fraud Investigation

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117249	Forensic Fraud Investigation	2	30	2 Hrs	30+20=50

Course Objectives:	1. To introduce students to the fundamental concepts of forensic fraud investigation and its role in modern financial systems. 2. To provide knowledge of fraud detection techniques such as data analysis, ratio analysis, and transaction monitoring. 3. To train students in the collection, preservation, and evaluation of financial and digital evidence. 4. To familiarize students with legal frameworks, cyber laws, and regulatory provisions related to fraud investigation.
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Course Outcomes:	After successful completion of the course, a student will be able to- 1. Understand the fundamental concepts, scope, and importance of forensic fraud investigation in financial and corporate environments. 2. Identify different types of frauds including corporate fraud, banking fraud, cyber fraud, and occupational fraud. 3. Apply systematic methods and investigative procedures to detect and analyze fraudulent activities. 4. Examine financial statements and transaction records to identify anomalies and suspicious patterns. 5. Collect, preserve, and evaluate financial and digital evidence following standard forensic procedures. 6. Demonstrate knowledge of fraud detection techniques such as ratio analysis, data analytics, and trend analysis. 7. Understand legal provisions, cyber laws, and regulatory frameworks related to fraud investigation in India. 8. Develop critical thinking and analytical skills for solving complex fraud-related cases.
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Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Fraud and White-Collar Crime Meaning and scope of fraud investigation. White-collar crimes: embezzlement, corruption, bribery, accounting fraud, identity theft, insider trading. Fraud triangle: pressure, opportunity, rationalization. Roles of investigators, auditors, and forensic accountants. Ethics, confidentiality, and professional conduct.	7 Hrs.	7 Marks	Interactive Lectures: Use multimedia presentations, interactive slides, and animations. Hands-On Models: use of model Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning:
Unit II	Fraud Detection and Investigation Red flags and warning signs of fraud. Methods of detection: document review, transaction analysis, interviews, surveillance, digital evidence. Evidence collection, preservation, and chain of custody. Basics of fraud examination and report preparation. Internal control weaknesses that enable fraud.	8 Hrs.	8 Marks	
Unit III	Case Studies in White-Collar Crime Harshad Mehta securities scam. Satyam accounting fraud. Ketan Parekh stock market scam. Ponzi schemes and investment fraud. Corporate fraud, banking fraud, and procurement fraud case studies. Lessons learned from each case.	7 Hrs.	7 Marks	
Unit IV	Mitigation and Prevention Internal controls and segregation of duties. Whistleblower mechanisms and fraud reporting systems. Corporate governance and compliance. Risk assessment and fraud	8 Hrs.	8 Marks	

	prevention plans. Training, audits, monitoring, and corrective action.			Explore topics through questioning, investigation, and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Any other innovative pedagogy as applicable.
References:	1. Fraud Detection and Forensic Accounting – Dr. P.C. Jain 2. Principles of Fraud Examination by Joseph T. Wells. 3. Fraud Prevention and Detection in Organizations – Dr. S. Ramanathan 4. Fraud Risk Management. 5. Fraud Examination by W. Steve Albrecht. 6. Corporate Governance, Risk and Compliance – CA Kamal Garg Web resources: 1. https://www.acfe.com . 2. https://www.theiia.org 3. https://www.rbi.org.in/ 4. https://www.nist.gov			
Model Questions:	Short Type (At least 6) (1 Marks each) 1. Define fraud investigation. 2. What is occupational fraud? 3. Expand AML. 4. What is cyber fraud? 5. What is digital evidence? 6. Define internal control. 7. Define corporate fraud.			
	Answer in brief (At least 6) (3 Marks each) 1. Explain the objectives of fraud investigation. 2. Describe types of financial frauds. 3. Explain the Fraud Triangle theory. 4. What are the stages of fraud investigation? 5. Explain the role of internal control in fraud prevention. 6. Describe techniques used in fraud detection. 7. Explain cyber frauds in banking systems. 8. Write a note on money laundering. 9. Explain the importance of audit evidence. 10. Describe digital evidence in fraud cases.			
	Answer in Detail (At least 4) (6 Marks each) 1. Define fraud investigation and explain its process in detail. 2. Discuss different types of frauds with examples. 3. Explain the role of forensic accounting in fraud detection and prevention. 4. Describe the Fraud Triangle and its application in fraud cases. 5. Explain cyber frauds and their investigation techniques. 6. Discuss money laundering and its stages with examples. 7. Explain the importance of internal control systems in fraud prevention. 8. Describe the role of forensic investigators in legal proceedings. 9. Explain fraud risk management framework in organizations. 10. Discuss the importance of digital evidence in fraud investigation.			
	MCQs for Internal Assessment (At least 4) 1. Fraud investigation mainly deals with: a) Marketing b) Fraud detection and analysis c) Production d) Sales Answer: b 2. Which theory explains fraud behavior? a) Demand theory b) Fraud triangle c) Supply theory d) Utility theory Answer: b 3. Phishing is an example of: a) Physical theft b) Cyber fraud c) Tax fraud			

	d) Insurance fraud Answer: b 4. Which is digital evidence? a) Emails b) Bank statements c) Ledgers d) Receipts Answer: a 5. Whistleblowing means: a) Hiding fraud b) Reporting fraud c) Creating fraud d) Ignoring fraud Answer: b 6. Fraud risk assessment is used for: a) Sales increase b) Fraud prevention c) Advertising d) Production Answer: b
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Course Category: **Major Elective Lab**
117250 FRS Lab 22B

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117250	FRS Lab 22B	2	60	4 h	25+25= 50

Course Objectives:	1. To provide hands-on experience in identifying, analyzing, and investigating different types of financial frauds. 2. To develop practical skills in detecting fraudulent transactions using accounting records and financial statements. 3. To train students in applying forensic investigation techniques for fraud detection and prevention. 4. To enable students to examine real or simulated fraud cases using systematic investigative procedures. 5. To develop skills in collection, preservation, and analysis of financial and digital evidence.		
Course Outcomes:	Upon successful completion of this course, students will be able to: 1. Understand the basic concepts and scope of forensic fraud investigation in financial systems. 2. Identify different types of frauds such as corporate fraud, banking fraud, cyber fraud, and occupational fraud. 3. Apply systematic investigative procedures to detect and analyze fraudulent activities. 4. Examine financial statements and accounting records to identify irregularities and suspicious transactions. 5. Detect red flags and abnormal patterns in financial and transactional data. Collect, preserve, and analyze financial and digital evidence following standard forensic procedures. 6. Use basic forensic tools and data analysis techniques for fraud detection.		
Unit System	Contents	Incorporation of Pedagogies	
Tutorial and Discussion	1. Identify common types of fraud in banking and corporate sectors. 2. Explain the role of forensic accountant in a fraud case study. 3. Prepare a sample fraud risk assessment sheet. 4. Explain how data analysis tools help in fraud detection. 5. Discuss ethical issues in fraud investigation practice. 6. Importance of teamwork in forensic investigation labs. 7. Future scope of forensic fraud investigation in India. 8. Role of government agencies in fraud detection and prevention.	• Experiential Learning: Hands-on experimentation using Analysis of real/simulated fraud cases. Preparation of financial statements for fraud detection Identification of red flags in transaction data Bank reconciliation exercises reinforce theoretical concepts. • Inquiry-Based Learning: Students hypothesize investigate and find answers independently. Trace fraud patterns. Analyze anomalies in data sets. Identify causes of financial irregularities. Independent thinking and research skills principles. • Collaborative Learning: Students work in teams for investigation tasks.	

Forensic Fraud Investigation Practical	1. Identification of Fraud Indicators. 2. Financial Statement Analysis for Fraud Detection 3. Ratio Analysis for Fraud Detection: Calculate liquidity and profitability ratios. 4. Bank Reconciliation Statement (Fraud Detection): Prepare BRS from given data. 5. I Detection of Fake Invoices: Identify duplicate or forged entries 6. Digital Evidence Analysis: Examine sample emails or transaction logs. 7. Identify cyber fraud indicators 8. Preparation of Forensic Investigation: Report Compile findings from case study. 10. Money Laundering Case Study: Identify stages of laundering 11. Fraud Case Simulation: Identify fraud type and method.	Group fraud case analysis. Joint preparation of reports. Peer discussion on findings. Teamwork and communication skills. Technology-Enhanced Learning: Use of digital tools for fraud analysis. Microsoft Excel (sorting, filtering, formulas). Basic data analytics tools. Spreadsheet-based fraud detection. Digital transaction logs. Digital literacy and forensic data skills. Inquiry-Based Learning: Explore topics through questioning, investigation, and research. Students independently investigate cyber incidents. Activities Digital evidence examination Cybercrime pattern identification. Research on emerging cyber threats Benefits Encourages curiosity and research skills Promotes independent learning ICT-Enabled Learning Use of digital tools and online forensic resources. Tools: Wireshark, FTK Imager Autopsy, Cellebrite (basic exposure), Excel and Power BI for log analysis. Benefits Improves digital competency Provides technical exposure Supports practical cyber investigation learning Collaborative Learning Students work in teams during investigations. Activities Group cybercrime analysis, Team-based case study discussions Collaborative report preparation Outcomes Teamwork and communication skills Peer learning and cooperation Case-Based Learning: Teaching through real fraud scenarios. Corporate fraud case studies Banking fraud investigations Cyber fraud and phishing cases Money laundering case analysis. Improved analytical and decision-making skills Better understanding of fraud patterns Any other innovative pedagogy as applicable.
References	1. Forensic Accounting and Fraud Detection (Practical Approach) – Dr. S. Ramanathan 2. Auditing and Forensic Accounting Practical Manual – Tulsian & Tulsian. 3. Forensic Accounting and Investigation Standards in India – CA Kamal Garg. 4. Practical Auditing – B.N. Tandon. 5. Digital Evidence and Computer Crime by Eoghan Casey Web resources: https://www.acfe.com https://www.theiia.org https://www.icaai.org https://fiuindia.gov.in https://www.ssrn.com https://www.nist.gov	
Model Questions:	NA	

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment

- | | |
|--|-----------------|
| • Active participation in activities | 10 Marks |
| • Continuous Assessment Tests (CAT) (At least three tests) * | 10 Marks |
| • Submission of duly certified practical record | 05 Marks |
| Total | 25 Marks |

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Section 2: External Assessment

- | | |
|--|-----------------|
| • Exercise 1 (Organic Chem Practical) | 10 Marks |
| • Exercise 2 (Physical Chem Practical) | 10 Marks |
| • Viva-Voce (external) | 05 Marks |
| Total | 25 Marks |

Course Category: **Minor (Theory)**
117251 Digital and Cyber Forensics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117251	Digital and Cyber Forensics	2	30	2 Hrs	30+20=50

Course Objectives:		Students will familiarize about 1. To understand underlying principles and many of the techniques associated with the digital forensic practices and cyber crime 2. To explore practical knowledge about digital forensic methodology. 3. To learn the importance of evidence handling and storage for various devices 4. To develop an excellent understanding of current cyber security issues and analyzed the ways that exploits in securities.		
Course Outcomes:		After completing the course in Digital and Cyber Forensics, students will be able to: 1. Understand the fundamental concepts, scope, and importance of digital and cyber forensics in modern investigations. 2. Identify different types of cybercrimes such as hacking, phishing, identity theft, malware attacks, and online frauds. 3. Explain the process of digital evidence collection, preservation, and analysis following forensic standards. 4. Apply basic techniques for investigating computer systems, mobile devices, and network-based crimes. 5. Demonstrate knowledge of cyber laws, IT Act provisions, and legal procedures related to digital evidence. 6. Analyze digital footprints such as emails, logs, files, and transaction records for forensic investigation. 7. Understand the role of forensic tools and technologies used in cybercrime investigations.		
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Foundations of ICT and Digital Systems Meaning, scope, and applications of ICT. Components of a computer system: hardware, software, firmware. Input, output, storage, and communication devices. Types of computers and basic system concepts. Operating system basics, desktop use, files, folders, and file management. Introduction to typing, digital work habits, and safe computer use.	8 Hrs.	8 Marks	Interactive Lectures: Students learn through practical exposure and hands-on cyber investigation activities. Digital evidence collection Log file analysis Email and cyber fraud investigation Malware and phishing case analysis. Network traffic monitoring exercises. Develops practical forensic skills Enhances problem-solving ability. Improves technical competency Problem-Solving Sessions: Organize regular problem-solving sessions. Explore virtual labs and simulations to enhance understanding of the topic. Flip-Class: Assign readings or video lectures as homework and use class time for interactive discussions. Ask students to create concept maps that illustrate the relationships between different concepts. Inquiry-Based Learning: Explore topics through questioning, investigation,
Unit II	Internet, Communication, and Cyber Safety Internet, intranet, WWW, browsers, and search engines. Email, cloud storage, online collaboration, and video conferencing. Downloading, uploading, bookmarks, and safe browsing. Social media basics and responsible digital communication. Cybercrime awareness: hacking, phishing, malware, ransomware, identity theft, online fraud, cyberstalking. Password hygiene, privacy, digital citizenship, and ethical use of technology.	7 Hrs.	7 Marks	
Unit III	Introduction to Digital and Cyber Forensics Meaning, scope, and importance of digital and cyber forensics.	8 Hrs.	8 Marks	

	Digital evidence: nature, characteristics, relevance, and admissibility. Chain of custody, evidence preservation, and documentation. Basics of cyber ethics and forensic workflow. Overview of digital evidence from computers, mobile devices, and online accounts. Introduction to biometrics: fingerprints, face recognition, iris, voice, and gait basics.			and research. Case-Based Learning: Analyze and discuss real cases to apply theoretical knowledge. Real-world cybercrime cases are analyzed. Phishing attacks, Identity theft Online banking frauds Data breaches, social engineering attacks. Outcomes, Connects theory with practice. Enhances analytical thinking. Improves investigation skills Any other innovative pedagogy as applicable.
Unit IV	Incident Response, Tools, and Legal Awareness Incident response steps: preparation, detection, containment, eradication, recovery, and reporting. Digital forensic investigation steps. Commonly available tools for analysis: disk imaging, file recovery, browser history viewers, log analyzers, hash tools, and basic network monitoring tools. Basics of malware analysis and email analysis. IT Act basics: key cyber offences and penalties. Online complaint and awareness systems in India, including cybercrime reporting portals. Guidelines for data protection, data security, privacy, and lawful handling of digital records.	7 Hrs.	7 Marks	
References:	1. Computer Forensics: Computer Crime Scene Investigation, Volume 1 John R. Vacca, Charles River Media 2. Advances in Digital Forensics II edited by Martin S. Olivier, Sujeet Sheno 3. Computer Forensics: Investigating File and Operating Systems, Wireless networks and storage CHFI By EC Council (book 2 of 4) 4. Handbook of Security, Cryptography & Digital Signature 5. Forensic Science – From the Crime Scene to the Crime Lab by Richard Saferstein 6. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill 7. Cyber Law and E. Commerce, David Baumer, J C Poindexter, TMG Cyberlaw Simplified Vivek Sood, TMG 8. e-Commerce Strategy, Technologies and Applications, David Whiteley, McGraw Hill International 9. E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG 10. Firewalls and Internet Security: Repelling the Wily Hack 10 Web resources: 1. https://www.nist.gov/itl/csd . 2. https://www.cisa.gov/topics/cybersecurity-best-practices 3. https://www.interpol.int/Crimes/Cybercrime 4. https://www.sans.org/digital-forensics/			
Model Questions:	Short Type (At least 6) (1 Marks each) 1. What is digital forensics? 2. Define cybercrime. 3. What is cyber forensics? 4. Expand IP address. 5. What is phishing? 6. Define malware. 7. What is digital evidence? 8. What is chain of custody?			
	Answer in brief (At least 6) (3 Marks each) 1. Explain the objectives of digital forensics. 2. Describe the stages of cyber forensic investigation. 3. Explain the importance of digital evidence. 4. Explain network forensics. 5. Describe ransomware attacks. 6. Explain data recovery techniques in cyber forensics.			

	7. Explain email spoofing and cyber frauds. 8. Describe cyber investigation tools. 9. Explain ethical issues in cyber forensics.
	Answer in Detail (At least 4) (6 Marks each) 1. Define digital forensics and explain its importance in cybercrime investigation. 2. Explain the complete process of digital forensic investigation. 3. Describe methods of collecting and preserving digital evidence. 4. Explain the role of network forensics in cyber investigations. 5. Explain the importance of cybersecurity measures in preventing cybercrime. 6. Describe various digital forensic tools used in cyber investigations.
	MCQs for Internal Assessment (At least 4) 1. Digital forensics mainly deals with: a) Physical evidence b) Digital evidence investigation c) Marketing analysis d) Production systems Answer: b 2. Phishing is mainly used for: a) Data protection b) Stealing sensitive information c) Network repair d) File compression Answer: b 3. Which of the following is a malware? a) Firewall b) Antivirus c) Trojan d) Router Answer: c 4. Chain of custody is important for: a) File deletion b) Maintaining evidence integrity c) Increasing internet speed Answer: b 5. Ransomware attacks generally: a) Encrypt files and demand payment b) Improve system security c) Create backups d) Speed up computers Answer: a 6. Which tool is commonly used for network analysis? a) Wireshark b) Photoshop c) Tally d) Excel Answer: a 7. Identity theft means: a) Network monitoring b) Unauthorized use of personal identity c) File compression d) Password creation Answer: b

Course Category: **Minor Lab**
117252 Digital and Cyber Forensics Lab - 23

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117252	Digital and Cyber Forensics Lab - 23	2	60	4 h	25+25= 50

Course Objectives:	The intended objectives are: 1. To introduce students to the fundamental concepts and scope of digital and cyber forensics. 2. To provide practical knowledge of cybercrime investigation and digital evidence handling. 3. To develop skills in identifying, collecting, preserving, and analyzing digital evidence from various electronic devices. 4. To familiarize students with cyber forensic tools and technologies used in investigations. 5. To train students in investigating cybercrimes such as phishing, hacking, identity theft, malware attacks, and online frauds. 6. To develop practical skills in network analysis, log analysis, and email investigation.	
Course Outcomes:	Upon successful completion of this course, students will be able to: 1. To understand the procedures for maintaining integrity and chain of custody of digital evidence. 2. Understand the fundamental concepts, scope, and importance of digital and cyber forensics in cybercrime investigations. 3. Identify various types of cybercrimes such as phishing, hacking, malware attacks, identity theft, ransomware, and online frauds. 4. Apply standard procedures for collection, preservation, and analysis of digital evidence. 5. Demonstrate the ability to examine digital devices, files, logs, emails, and network data for forensic investigation. 6. Use basic cyber forensic tools and technologies for digital evidence analysis and cybercrime investigation.	
Unit System	Contents	Incorporation of Pedagogies
Tutorial and Discussion	1. Explain the steps involved in digital forensic investigation. 2. Describe the process of collecting and preserving digital evidence. 3. Explain the importance of chain of custody in cyber investigations. 4. Demonstrate how phishing attacks are investigated. 5. Explain the role of log analysis in cyber forensics. 6. importance of digital and cyber forensics in modern investigations. 7. Challenges faced during cybercrime investigations. 8. Role of artificial intelligence in cyber forensic analysis. 9. Importance of digital evidence in legal proceedings. 10. Impact of cybercrime on banking and financial systems.	• Hands-on Experimental Learning – Practical laboratory sessions for solution preparation, titration, and organic compound identification. • Inquiry-Based Learning – Encouraging students to analyze unknown solutions and predict concentrations based on calculations. • Conceptual Visualization – Demonstrations, charts, and digital simulations for understanding solution chemistry and functional group identification. • Collaborative Learning – Group discussions and peer review of experimental procedures and results.
Digital and Cyber Forensics Practical	1. Introduction to Digital Forensic Tools: To familiarize students with basic digital forensic tools and lab environment. 2. Collection and Preservation of Digital Evidence: To learn procedures for handling digital evidence. 3. Deleted File Recovery: To recover deleted digital data. 4. To identify potential digital evidence from computer systems 5. To create a forensic image of storage media. 6. To recover deleted files from storage media. 7. To investigate internet activity 8. To investigate suspicious emails.	• Problem-Based Learning (PBL) – Application of theoretical concepts to real-world scenarios, such as industrial and pharmaceutical solution preparations. • Digital & Flipped Learning – Pre-lab instructional videos, online quizzes, and virtual lab simulations for self-paced understanding. This integrated approach ensures students develop technical competence, analytical skills, and a

	9. To identify password security and forensic recovery. 10. To analyze network traffic. 11. To trace network activities	deeper understanding of solution chemistry and organic qualitative analysis.
References	1. Guide to Computer Forensics and Investigations - Bill Nelson, Amelia Phillips, 2. Digital Evidence and Computer Crime - Eoghan Casey. 3. Computer Forensics and Cyber Crime - Marjie T. Britz. 4. Practical Digital Forensics - Akashdeep Bhardwaj and Keshav Kaushik 5. Digital Forensics, Investigation, and Response - Chuck Easttom. 6. Cyber Forensics - Nandan Kamath. 7. Information Security and Cyber Laws - Surya Prakash Tripathi 8. Cyber Crime Investigation and Digital Forensics - Nishant Singh Web Resources: 1. https://www.cert-in.org.in 2. https://cybercrime.gov.in 3. https://www.meity.gov.in 4. https://www.nist.gov 5. https://www.forensicfocus.com	
Model Questions:	NA	

Distribution of Marks and the scheme of Practical Examination is as follows:

Section 1: Internal Assessment		
• Active participation in activities		10 Marks
• Continuous Assessment Tests (CAT) (At least three tests) *		10 Marks
• Submission of duly certified practical record		05 Marks
Total		25 Marks
*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations		
Section 2: External Assessment		
• Exercise 1		10 Marks
• Exercise 2		10 Marks
• Viva-Voce (external)		05 Marks
Total		25 Marks

117253 FRS Lab 24

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117253	FRS Lab 24	2	60	4 Hrs	50
Course Objectives:		The intended objectives are: 1. To develop practical skills in digital and cyber forensic investigation. 2. To train students in identifying, collecting, and analyzing digital evidence. 3. To provide hands-on experience in cybercrime investigation techniques. 4. To familiarize students with forensic tools and ICT security applications. 5. To enhance ability to investigate real-world cyber frauds and attacks. 6. To develop report writing and documentation skills for forensic cases. 7. To promote understanding of cyber laws and ethical practices.					
Course Outcomes:		Upon successful completion of this course, students will be able to: 1. Conduct basic digital forensic investigations using standard procedures. 2. Identify cybercrimes such as phishing, hacking, malware, and identity theft. 3. Collect and preserve digital evidence maintaining chain of custody. 4. Analyze emails, logs, files, and network data for investigation purposes. 5. Use basic forensic tools for data recovery and cyber analysis. 6. Investigate cyber fraud and online financial crimes. 7. Prepare structured forensic investigation reports.					
Unit System		Contents		Incorporation of Pedagogies			
Tutorial and Discussion		1. Cyber Fraud Investigation Phishing and online scams. 2. Forensic Tools (Basic Level): Wireshark, Autopsy, FTK Imager, Excel-based forensic analysis. 3. Cyber Law & Ethics: IT Act basics.		To enhance student engagement and learning outcomes, the following pedagogical approaches will be incorporated: • Experiential Learning (Hands-on Laboratory Work) a. Conduct guided experiments on the synthesis of industrially relevant organic compounds. b. Perform extractions and isolations of natural products to develop technical proficiency. • Inquiry-Based Learning a. Encourage students to analyze reaction mechanisms and predict product yields. b. Promote critical thinking by comparing conventional and green synthesis approaches. • Collaborative Learning a. Facilitate group-based experimental work to enhance teamwork and problem-solving skills. b. Conduct peer discussions on challenges and improvements in experimental procedures. • Technology-Enhanced Learning a. Use digital tools (e.g., molecular modeling software, virtual labs) to visualize reaction pathways. b. Integrate spectroscopy and chromatography techniques for product characterization. • Case-Based and Problem-Solving Approach a. Analyze industrial case studies related to pharmaceutical synthesis and natural product extraction. b. Discuss challenges in large-scale production and sustainability in chemical industries. • Assessment through Reflective Learning a. Encourage students to maintain lab journals for recording observations and interpretations.			
VSC FRS Practicals		1. Digital Evidence Handling: Identification and collection of evidence. 2. Cyber fraud investigation A Case Studies. 4. Web Browser Forensics: Cookies and cache examination. 5. Log File Analysis: System and server log examination. 6. Mobile Forensics (Basic) SIM and call log analysis. 7. Cyber Forensic Report Writing: Case documentation. 8. Complete cybercrime investigation simulation 9. Identify attacker, method, and evidence. 10. Creation of Forensic Image: Disk imaging process					

References	1. Practical Digital Forensics. Dr. Akashdeep Bhardwaj, Keshav Kaushik 2. Guide to Computer Forensics and Investigations. Bill Nelson Amelia Phillips Christopher Steuart 3. Handbook of Digital Forensics and Cyber Crime. Dr. Meenal Dhal, Dimpal, Ms. Jasleen Kaur, Prof. Anup Kumar Kapoor 4. The Basics of Digital Forensics. 5. Computer Forensics and Cyber Crime: An Introduction Best for theory + practical 6. Cybercrime and Digital Forensics. Web Resources: 1. https://in.bpbonline.com 2. https://www.cert-in.org.in 3. https://www.autopsy.com 4. https://www.volatilityfoundation.org
Model Questions:	NA

Distribution of Marks and the scheme of (VSC) Practical Examination is as follows:

Section I: Continuous Internal Assessment	
• Continuous Assessment Tests (CAT) (At least three tests) *	15 Marks
• Submission of duly certified practical record	10 Marks
Total	25 Marks
Section II: End Semester Examination (Internal only)	
• Exercise 1	20 Marks
• Viva-Voce (internal)	05 Marks
Total	25 Marks
Total (Section I And II)	50 Marks

*Note: Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations

Course Category: Internship / Apprenticeship/ OJT							
117254 Internship/ Apprenticeship/ OJT (On the Job Training)							
Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	117254	Internship/ Apprenticeship/ OJT (On the Job Training)	4	80	--	100

Course Objectives:	1. To provide hands-on training in forensic laboratory techniques, crime scene investigation, evidence collection, preservation, and analysis using standard forensic procedures. 2. To develop professional, analytical, and communication skills through practical exposure to forensic practices, legal procedures, and modern investigative technologies.
Course Outcomes:	Upon successful completion of this course, students will be able to: 1. Demonstrate proficiency in basic forensic laboratory practices, evidence handling, and documentation procedures. 2. Apply scientific principles and analytical techniques for examination and interpretation of forensic evidence. 3. Follow standard operating procedures, safety guidelines, and chain-of-custody requirements in forensic investigations. 4. Analyze and report forensic observations accurately in a professional and ethical manner. 5. Utilize modern forensic instruments, digital tools, and investigative techniques relevant to forensic science. 6. Exhibit teamwork, communication, critical thinking, and professional skills required for careers in forensic laboratories, law enforcement agencies, and related sectors.
Guidelines/ SoP for Internship / Apprenticeship/ OJT For understanding key principles of Internship/Apprenticeship/OJT operational guidelines and implementation strategy please refer 1. https://www.ugc.gov.in/pdfnews/2051511_Internship-Research-Internship-Guidelines.pdf 2. https://www.sgbau.ac.in/pdf/1092Internship%20Policy.pdf As per NEP 2020, students of B Sc. III need to undertake Internship / Apprenticeship/ OJT for FOUR (4) credits i.e. 100 Marks. The guidelines for Internship / Apprenticeship/ OJT are as follows: 2. Credit: 04 3. Duration: 120 Hrs 4. Internship Period: Ideally, the internship should be completed during the summer break between the second and third year. Students who are unable to complete the internship during this period must ensure its completion by the end of the VI semester, either in a part-time manner during Semester V, or during the Diwali break, or winter break or through an alternative arrangement subject to prior approval by the parent institution (University School/College). 5. Internship Categories: i. Internship for enhancing the employability: Employability is a set of skills and attributes developed through a range of experiences at workshops and workplaces. ii. Internship for developing the research aptitude: Research internship aims at providing hands-on training to work on research tools, techniques, methodologies, equipment, policy framework and various other aspects in pursuing quality research. 6. Implementation and assessment: For implementation and assessment of this vertical a separate SoP or relevant document that shall be provided by the University will be applicable. 7. These can be implemented through: 1. Industries 2. Research labs 3. Government testing laboratories 4. Colleges/departments 5. MSMEs and startups 6. Online/virtual internships with report and viva evaluation Some suggested forms of Internship / Apprenticeship/ OJT are: Model 1: Crime Scene Investigation Internship • Crime scene documentation	

• Evidence collection • Photography and reporting • Case file preparation Model 2: Forensic Laboratory Internship • Chemical, biological, and toxicological analysis • Instrument handling • Quality assurance practices Model 3: Cyber Forensics Internship • Digital evidence recovery • Cybercrime investigation • Mobile and computer forensics Model 4: Community Forensics Project • Cyber safety awareness • Drug abuse awareness • Mock forensic investigations Model 5: Research-Based Internship • Mini research project • Data analysis • Report writing and presentation These internships can be conducted through organizations such as: • Directorate of Forensic Science Services laboratories • State Forensic Science Laboratories • Police departments • Cybercrime cells • Medical colleges with forensic medicine departments • Universities and research institutions • Accredited private forensic laboratories Such internships typically culminate in a logbook, internship report, presentation, and viva voce assessment.	
References	https://www.ugc.gov.in/pdfnews/2051511_Internship-Research-Internship-Guidelines.pdf https://www.sgbau.ac.in/pdf/1092Internship%20Policy.pdf
Model Questions:	NA