

# **Choice Based Credit System (CBCS)**

B.Sc. / B.Sc.-M.Sc. (Forensic Science) - IV SEMESTER Batch (2021-2024)

#### **BSFSN401 FORENSIC CHEMISTRY**

COURSE CODE	TEACHING & E							TON SCHEME						
			THEORY			PRACTICAL								
	CATEGORY	COURSE NAME	END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	Т	P	CREDITS			
BSFSN401	DC	Forensic Chemistry	60	20	20	30	20	4	0	2	5			

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

Course Objectives: : After studying this paper the students will know –

- 1. The methods of analyzing contaminants in petroleum products.
- 2. The classification and analysis of Forensic Chemistry.
- 3. The method of searching, collecting, preserving and analyzing arson evidence.
- 4. The classification of explosives, including the synthesis and characterization of representative analogs.

Course Outcomes: After studying this paper

- 1. The student will be able to understand the concept of forensic chemistry
- 2. They will be able to know the chemistry of different petroleum products and explosive Substances.
- 3. They will be able to examine the alcoholic and non-alcoholic beverages.

### **Unit 1: Petroleum and Petroleum Products**

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.

### **Unit 2: Analysis of beverages:**

Analysis of Beverages: Alcoholic and non-alcoholic beverages and their composition, Analysis of alcoholic beverages as per BIS and PFA Act. Distinction between licit and illicit liquors.

<sup>\*</sup>Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.



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## **Unit 3: 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.

## Unit 4: Explosives I

**Classification of explosives**: Low explosives and high explosives. Homemade explosives. Military explosives. Blasting agents. Synthesis and characteristics of TNT. Explosion process. Blast waves.

## **Unit 5: Explosive II**

Bomb scene management. Searching the scene of explosion. Mechanism of explosion. Post blast residue collection and analysis. Case Studies of explosion cases. **Blast injuries**: Detection of hidden explosives.

#### **Practicals:**

- 1. To carry out analysis of gasoline.
- 2. To carry out analysis of diesel.
- 3. To carry out analysis of kerosene oil.
- 4. To analyze arson accelerators.
- 5. To prepare a case report on a case involving arson.
- 6. To carry out analysis of explosive substances.
- 7. To separate explosive substances using thin layer chromatography.



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## **Suggested Readings**

- 1. J.D. DeHaan, Kirk's Fire Investigation, 3rd Edition, Prentice Hall, New Jersey (1991).
- 2. 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).
- 3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
- 4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).
- 5. S. Ballou, M. Houck, J.A. Siegel, C.A. Crouse, J.J. Lentini and S. Palenik in *Forensic Science*, D.H. Ubelaker (Ed.), Wiley-Blackwell, Chichester (2013).
- 8. To prepare a case report on bomb scene management.



# **Choice Based Credit System (CBCS)**

B.Sc. / B.Sc.-M.Sc. (Forensic Science) - IV SEMESTER Batch (2021-2024)

## **BSFSN402 QUESTIONED DOCUMENT**

COURSE CODE				TEA	CHIN	G & EVALU	ATIO	N SC	HEN	ИE	
			THEORY		PRACTICAL						
	CATEGORY	COURSE NAME	END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	Т	P	CREDITS
BSFSN402	DC	Questioned Document	60	20	20	30	20	3	0	2	4

**Legends**: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

## Course Objectives: After studying this Paper the Students will Know-

- 1. The fundamentals of questioned document.
- 2. Examination, identification and comparison of questioned document.
- 3. The basic principles and characteristics of handwriting.

### Course Outcomes: After studying this paper-

- 1. The student will be able to understand the different types of documents.
- 2. They will be able to understand the importance of document examination.
- 3. They will be able to know the methods for decipherment of secret writing.
- 4. They will be able to outline the importance of computer aided tools for examination of questioned documents

### **Unit 1:Nature and Scope of Questioned Documents:**

Definition of questioned documents. Types of questioned documents. Preliminary examination of documents.

#### Unit 2: Basic tools needed for forensic documents' examination:

Ultraviolet, Visible, Infraredand Fluorescence Spectroscopy, Photomicrography, Microphotography, Visible Spectral Comparator, Electrostatic Detection Apparatus. Determining the age and relative age of documents.

### **Unit 3: Comparison of Documents**

Comparison of handwriting. Development of individuality in handwriting. Natural variations and fundamental divergences in handwritings. Class and individual characteristics.

### **Unit 4: Comparison of Handwriting**

Merits and demerits of exemplar and non-exemplar samples during comparison of handwriting. Standards for comparison of handwriting. Comparison of paper, ink, printed documents, typed documents, Xeroxed documents.

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# **Choice Based Credit System (CBCS)**

B.Sc. / B.Sc.-M.Sc. (Forensic Science) - IV SEMESTER Batch (2021-2024)

### **Unit 5: Forgeries**

Alterations in documents, including erasures, additions, over-writings and obliterations. Indented and invisible writings. Charred Documents. Examination of counterfeit Indian currency notes, passports, visas and stamp papers. Disguised writing and anonymous letters.

#### **Practicals:**

- 1. To identify handwriting characters.
- 2. To study natural variations in handwriting.
- 3. To compare handwriting samples.
- 4. To detect simulated forgery.
- 5. To detect traced forgery.
- 6. To study the line quality defects in handwriting samples.
- 7. To examine the security features of currency notes, passports and plastic money.
- 8. To study alterations, obliterations and erasures in handwriting samples.
- 9. To cite a case wherein Section 45 of Indian Evidence Act was invoked, seeking expert opinion for authentication of handwriting and/or signatures.
- 10. To cite a case wherein Section 489A of the Indian Penal Code was invoked in context of fake currency.

#### **Suggested Readings:**

- 1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
- 2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4<sup>th</sup>Edition, Foundation Press, New York (1995).
- 3. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London (2000).
- 4. E. David, The Scientific Examination of Documents Methods and Techniques, 2nd Edition, Taylor & Francis, Hants (1997).

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# **Choice Based Credit System (CBCS)**

B.Sc. / B.Sc.-M.Sc. (Forensic Science) - IV SEMESTER Batch (2021-2024)

#### **BSFSN403 FORENSIC BIOLOGY**

COURSE CODE			TEACHING & EVALUATION SCHEME								
			THEORY		PRACTICAL						
	CATEGORY	COURSE NAME	END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	Т	P	CREDITS
BSFSN403	DC	Forensic Biology	60	20	20	30	20	3	0	2	4

**Legends**: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

Course Objectives: After studying this Paper the Students will Know-

- 1. The significance of biological and serological evidence.
- 2. The forensic importance of hair evidence.
- 3. The importance of biological fluids blood, urine, semen, saliva, sweat and milk in crime investigations.
- 4. How wildlife forensics aid in conserving natural resources.
- 5. How forensic entomology assists in death investigations.

### Course Outcomes: After studying this paper-

- 1. The students will have the understanding of various forms of biological evidence.
- 2. They will be able to determine the importance of biological evidence such as blood Semen saliva etc in crime investigation.
- 3. Student will be able to know about wildlife Forensics.
- 4. They will be able to evaluate the significance of Microbes, insects and diatoms Criminal Investigations.

**Unit 1:Biological Evidence: I** Composition, Histology, Examination of blood and blood stains, Identification of lochial and menstrual stains by various methods.

**Semen:** Composition, St. of spermatozoa, Forensic methods of detection and identification of semen and seminal stain examination. Identification and examination of other body fluids/stains-vaginal, saliva, urine, pus, faces, vomit, milk, sweat &tears.

### Unit 2:

**Biological Evidence: II** Nature and importance of biological evidence. Significance of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair.

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## **Unit 3:Biological Evidence :III**

Types and identification of microbial organisms of forensic significance. Identification of wood, leaves, pollens and juices as botanical evidence. Diatoms and their forensic significance.

#### Unit 4: Wildlife Forensics:-

Fundamentals of wildlife forensic. Significance of wildlife forensic. Protected and endangered species of animals and plants. Illegal trading in wildlife items, such as skin, fur, bone, horn, teeth, flowers and plants. Identification of physical evidence pertaining to wildlife forensics. Identification of pug marks of various animals.

### **Unit 5:Forensic Entomology:**

Basics of forensic entomology. Insects of forensic importance. Collection of entomological evidence during death investigations.

#### **Practicals**

- 1. To examine hair morphology and determine the species to which the hair belongs.
- 2. To prepare slides of scale pattern of human hair.
- 3. To examine human hair for cortex and medulla.
- 4. To carry out microscopic examination of pollen grains.
- 5. To carry out microscopic examination of diatoms.
- 6. To cite a crime case in which diatoms have served as forensic evidence.
- 7. To prepare a case report on forensic entomology.
- 8. To prepare a case report on problems of wildlife forensics

### **Suggested Readings:**

- 1. E.J. Gardner, M. 1. Simmons and D.P. Snustad; Principles of Genetics; John
- 2. Wiley, New York; (1991)
- 3. H.G. Greenish & E. Collin; An anatomical Atlas of vegetable Powders; J&A
- 4. Churchill, London; (1904)
- 5. Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice Hall, Englewood
- 6. Cliff, New Jersey; (1982)
- 7. P. L. Williams and R. Warwick; Gray's anatomy; Churchill Livingston, London;
- 8. (1980)
- 9. Biology Methods manual; Metropolitan Police Forensic Science Laboratory,
- 10. London; (1978)
- 11. Herbert R. Mauersberger; Mathews Textile Fibres their physical, Microscopic
- 12. and chemical properties; John Wiley, New York; (1954)
- 13. R.P. Pandey, Plant Anatomy; S. Chand, new Delhi; (1998)
- 14. Kimball, John W; Biology; Arvind Publishing Co. New Delhi (1974)
- 15. Edwin, H. Mc Caney Human Genetics, The Molecular Revolution, Jones &
- 16. Bartlett Pub. London, (1993)
- 17. Albert's, B, Bray, D, Lewis, J, Roberts K & Watson, J.D; Molecular Biology of Cell,



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#### BSFSN404 ANTHROPOLOGY

COURSE CODE				TEA	CHIN	G & EVALU	ATIO	N SCI	HEN	ЛE	
			THEORY		PRACTICAL						
	CATEGORY	COURSE NAME	END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	Т	P	CREDITS
BSFSN 404	DC	Anthropology	60	20	20	30	20	3	0	2	4

**Legends**: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

Course Objectives: After studying this Paper the Students will Know-

- 1. Basis of Anthropology.
- 2. The Relationship between biology and anthropology.
- 3. Fundamental of physical and biological anthropology.
- 4. Basics of social anthropology.

Course Outcomes: After studying this paper-

- 1. The students will understand the basics of Anthropology
- 2. They will be able to get knowledge about the Human Genetics, Human Growth and Development.
- 3. Student will be able to know about Theories of organic evolution (Lamarckian, Darwinian, Mutational and Synthetic)

## Unit -1: Basics of Anthropology - I

Meaning and scope of anthropology, branches of anthropology; History and subject matter of physical/biological Anthropology.

### **Unit -2: Basics of Anthropology-II**

Relationship of Physical/Biological Anthropology with other disciplines: medical and health science, Life Sciences, Earth Sciences and Environmental Sciences.

### Unit -3: Fundamentals of Physical/Biological Anthropology

Human Evolution, Human Variation, Human Genetics, Human Growth and Development. Theories of organic evolution (Lamarckian, Darwinian, Mutational and Synthetic)

## **Unit -4: Position of Man in Animal Kingdom**

Living Primates, Distribution, Characteristics, Phylogeny, Classification: Comparative anatomy of man and apes; Primate Behavior.

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## **Unit -5: Social Anthropology**

History and Subject Matter: Relationship of Social and Cultural Anthropology with Sociology, Psychology, History, Economics and Political Science.

### **List of Practicals:**

- 1. The Practical will include the following techniques and methods in collection of data in social anthropology.
  - Observation
  - Interview
  - Questionnaire and
  - Schedule Genealogy Case Study.
- 2. The study Somatoscopy of Head, , Face, Nose, Eyes, Lips and Hair.
- 3. To study Indices of Cephalic Index, Nasal Index, Facial Index.
- 4. To study Somatometry: Drawing, description and use of the instruments used for anthropology measurements Standing Height Vertex, Sitting Height Vertex, Leg Length, Hand Length, Had Breadth, Head Circumference, Nasal Length, Nasal Breadth, Head length, Head Breadth.
- 5. To study Osteology: Axial Skeleton, Appendicular Skeleton and Vertebrae.

### **Suggested Readings:**

- 1. Craig Stanford, John S. Allen and Susan C. Anton (2008) Biological Anthropology (2<sup>nd</sup> Edition).
- 2. Craig Stanford, John S. Allen and Susan C. Anton (2009) Exploring Biological Anthropology: The Essentials, Prentice Hall.
- 3. Indera P. Singh and M.K. Bhasin: (1989) Anthropometry, Delhi, Kamla Raj Enterprises.
- 4. Thomas Hylland Eriksen (2010) Small Places, Large Issues : An Introduction to Social and Cultural Anthropology.
- 5. Nigel Rapport and Joanna Overing (2006) Social and Cultural Anthropology: The Key Concepts.
- 6. M.J. Herskovits (1974) Cultural Anthropology, New Delhi, Oxford and IBH Publications.

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# **Choice Based Credit System (CBCS)**

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#### **BSFSN 4051 INTRODUCTION TO BIOMETRY**

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COURSE CODE			TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
	CATEGORY	COURSE NAME	END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	Т	P	CREDITS
BSFSN4051		Introduction To Biometry	60	20	20	00	00	4	0	0	4

**Legends**: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

**Course Objectives:** After studying this paper the students will know –

- 1. The impart knowledge of Basic Biometric System.
- 2. Concepts of Verification and Identification.
- 3. Advances Biometric Technologies.
- 4. The classification of biometric processes.
- 5. The importance of behavioural biometry.

### **Course Outcomes:**

- 1. Student will be able to understand working of biometry
- 2. Student will know advances in Biometric system
- 3. Student will understand different Biometric systems

### **Unit 1: Fundamental aspects of Biometrics**

Definition, characteristics and operation of biometric system, Classification of biometric systems – physiological and behavioral, Strength and weakness of physiological and behavioral biometrics, Multimodal Biometrics.

### **Unit 2: Biometric Process**

Key biometric processes – enrollment, identification and verification, sensor module, feature extraction module, database module, matching module, Positive and negative identification, Performance measures used in biometric systems – FAR, FRR, GAR, FTA, FTE and ATV, Biometric versus traditional technologies.

### **Unit 3: Types of Biometrics**

Fingerprints Identification, Palm prints recognition, Iris recognition, retina identification, geometry of hand and face, Handwriting recognition, signatures identification, keystrokes dynamics, gait pattern analysis, Speaker recognition.

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### **Unit 4: Security of Biometric**

Introduction to Security of Biometric System, Adversary attacks: Insider Attacks, Infrastructure attacks, Attacks on user Interface: Impersonation, Obfuscation, Spoofing, Countermeasure of spoof detection, Attacks on biometrics processing: On system modules & at interconnections, Attack on template database & Countermeasures in biometric template security.

## **Unit 5: Applications of Biometric Technologies**

Applications of Biometric Technologies, Challenges and Issues in Using Biometrics, Biometric technologies under development: Blood pulse, Nailbed Identification, Body salinity Identification, vein Pattern, Facial thermography, Skin Luminescence, Brain Wave Pattern, Foot Dynamics.

### **Suggested Reading-:**

- 1. S. Nanavati, M. Thieme and R. Nanavati, *Biometrics*, Wiley India Pvt. Ltd. (2002).
- 2. P. Reid, Biometrics for Network Security, New Delhi (2004).
- 3. J.R. Vacca, *Biometric Technologies and Verification Systems*, Butterworth-Heinemann, Oxford (2007).
- 4. Anil K. Jain, Handbook of Biometrics



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### **BSFSN4052 FORENSIC LINGUISTICS**

COURSE CODE	CATEGORY COUL		TEACHING & EVALUATION SCHEME									
			THEORY			PRACTIO						
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	Т	P	CREDITS	
BSFSN4052		Forensic Linguistics	60	20	20	0	0	4		0	4	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

**Course Objectives**: After studying this paper the students will know –

- 1. Elements of Science used in Linguistic and areas of Forensic Linguistic
- 2. Auditory phonetics and speaker identification by victims and witnesses
- 3. Legal definition of stylistic and its applications from Forensic point of view

Course Outcomes: After studying this paper-

- 1. The students will understand Linguistic and Forensic Linguistic
- 2. They will be able to get knowledge about Auditory Phonetics.
- **3.** Student will be able to know about Forensic Stylistics.

#### **UNIT I Linguistic**

Definition and history of Linguistic, Linguistic as a science, elements of science used in Linguistic, Linguistic Variation, variation in languages, Group v/s individual variations, analysis of Variation, applied Linguistic.

### **UNIT II Introduction to Forensic Linguistic**

Definition of Forensic Linguistic, Language and the legal process, areas of Forensic Linguistic. Forensic application of Linguistic, Case Studies in forensic linguistics.

### **UNIT III Auditory Phonetics**

Speaker discrimination and identification by victims and witnesses, voice perception, discrimination and disguise. Identification of class characteristics of speakers including first-language interference, regional of social accent and dialect, speaker age.

### **UNIT IV Forensic Stylistics I**

Concept of style, style in language, legal definition of stylistic, procedural outline for authorship identification studies – organization of case, problems, method, findings and conclusion.

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## **UNIT V Forensic Stylistics II**

Forensic application of linguistic stylistics – questioned authorship, semantic and pragmatic interpretation of meaning, linguistic stylistics as evidence, issues in forensic stylistic analysis.

### **Reference Books:**

- 1. Geral R. McMenamin, Forensic Linguistic Advance.
- 2. Bethany K Duman, Forensic Linguistic: A brief Anthrology.
- 3. <u>John Olsson</u>, Forensic Linguistics An Introduction to Language, Crime and the Law.
- 4. CoulthardMalco, TheRoutledge, Handbook of Forensic Linguistics.
- 5. Malcolm CoulthardAn Introduction to Forensic Linguistics: Language in Evidence.