

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU./B.Sc./84/2022

It is hereby inform to all concerned that, on the recommendation of Dean, Faculty of Science & Technology, the Academic Council at its meeting held on 15 March 2022 has accepted the Syllabus of B.Sc. Forensic Science and Cyber Security Second and Third Year (IIIrd - VI th semester) with retrospective effect from the Academic Year 2020-21 & 2021-22 respectively.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
Ref.No. SU/B.Sc./2022/10426-36
Date:-29.03.2022.

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(Signature)
**Deputy Registrar,
Academic Section**

Copy forwarded with compliments to :-

- 1] **The Principal, concerned affiliated College,**
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] **The Principals, affiliated concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 3] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation,
- 2] The Section Officer,[B.Sc.Unit] Examination Branch,
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The In-charge, [E-Suvidha Kendra],
Rajarshi Shahu Maharaj Examination Branch,
- 6] The Public Relation Officer,
- 7] The Record Keeper,



**DR. BABASAHEB AMBEDKAR MARATHWADA
UNIVERSITY, AURANGABAD**

**Syllabus of
B.Sc. Forensic Science and Cyber Security
Second Year**

Three Year Degree Program

Semester Pattern

Semester III and IV

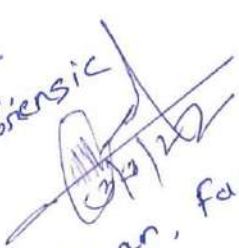
Effective from
Academic year 2020-21 onwards

B.Sc. Forensic Science and Cyber Security Program (Second Year)

General curriculum pattern of the program

Paper	Title of Paper	Marks				Work load Period/Week	
		Theory		Practical	Total	Theory	Practical/ Batch
		III	IV	(Annually)			
Semester III & IV							
I	Advanced Forensic Science	50	50	50	150	3	3
II	Advanced Forensic Chemistry	50	50	50	150	3	3
III	Advanced Forensic Physics	50	50	50	150	3	3
IV	Advanced Forensic Biology	50	50	50	150	3	3
V	Advanced Forensic Psychology	50	50	50	150	3	3
VI	Advanced Cyber Forensics	50	50	50	150	3	3
VII	Criminal Procedure Code	50	50	-	100	3	-
VIII	Law of evidence	50	50	-	100	3	-
Total		400	400	300	1100		

***Practical examination for Semester III and Semester IV will be conducted annually for 50 marks. The concerned departments are advised to conduct maximum number of experiments from the list provided and also other experiments related to theory syllabi having forensic importance. Minimum 12 experiments shall be reported in the journal for the purpose of certification.


 Ad-hoc Board in Forensic Science

 Dean, Faculty of Sci. & Tech.

Detailed Curriculum structure and marking scheme for theory and practical papers for semester-III and IV

Curriculum structure and marking scheme of theory papers			
Semester-III			
Course Code	Paper No.	Title of the Paper	Marks
BFC-3T1	I	Advanced Forensic Science	50
BFC-3T2	II	Advanced Forensic Chemistry	50
BFC-3T3	III	Advanced Forensic Physics	50
BFC-3T4	IV	Advanced Forensic Biology	50
BFC-3T5	V	Advanced Forensic Psychology	50
BFC-3T6	VI	Advanced Digital and Cyber Forensics	50
BFC-3T7	VII	Criminal Procedure Code	50
BFC-3T8	VIII	Law of evidence	50
Semester-IV			
BFC-4T1	I	Advanced Forensic Science	50
BFC-4T2	II	Advanced Forensic Chemistry	50
BFC-4T3	III	Advanced Forensic Physics	50
BFC-4T4	IV	Advanced Forensic Biology	50
BFC-4T5	V	Advanced Forensic Psychology	50
BFC-4T6	VI	Advanced Digital and Cyber Forensics	50
BFC-4T7	VII	Criminal Procedure Code	50
BFC-4T8	VIII	Law of evidence	50

Curriculum structure and marking scheme of practical papers			
Semester-III and IV (annual examination)			
Course Code	Paper No.	Title of the Paper	Marks
BFC-4P1	I	Practical based on papers BFC-3T1 and BFC-4T1	50
BFC-4P2	II	Practical based on papers BFC-3T2 and BFC-4T2	50
BFC-4P3	III	Practical based on papers BFC-3T3 and BFC-4T3	50
BFC-4P4	IV	Practical based on papers BFC-3T4 and BFC-4T4	50
BFC-4P5	V	Practical based on papers BFC-3T5 and BFC-4T5	50
BFC-4P6	VI	Practical based on papers BFC-3T6 and BFC-4T6	50

Sushruti
5/3/22

Examination pattern for theory and practical

The course of study for the B.Sc. Forensic Science and Cyber Security examination is divided into six semesters. Semester I, II, III, IV will have eight theory papers each of 50 marks while V and VI semester will have six papers each of 50 marks. There will be one practical paper for papers I to VI to be completed in a year and the examination of practical paper will be conducted at the end of even semesters. Each practical paper will carry 50 marks. Theory examination will be of 1.30 hours duration and practical examination will be of 3 hours duration.

Structure of Class and practical examination

Maximum number of students in a class for theory and practical will be as per the prevailing rules of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Standard of Passing and Award of Division

- (a) A candidate who secures minimum 40% of the marks in each subject/paper will be declared to have passed the examination.
- (b) A candidate who secures 50% or more but less than 60% of the aggregate marks prescribed for all the semester (i.e. six semesters) shall be awarded a second Division.
- (c) A candidate who secures an aggregate of 60% but less than 70% marks on the whole shall be declared to have passed the examination in first class.
- (d) A candidate who secures an aggregate of 70% and above marks on the whole shall be declared to have passed the examinations with Distinction.
- (e) ATKT Rules: - A candidate who has failed in **not more than** eight papers (theory and practical of semester III and IV taken together) at the second year examination and has cleared all the papers (Theory and Practical) of Semester I and II shall be allowed to keep terms for the third year. He/She shall be permitted to clear those papers before or along third year examination.

SEMESTER-III

Paper-I (BFC-3T1) Advanced Forensic Science

Max Marks: 50

Unit	Contents
Unit-I	Crime Reconstruction (CR): A history of crime reconstruction ,Ethics in CR, Observer effects and examiner bias, psychological influence on the forensic examiner, Subjectivity and expectation in Forensic Science,

	Recommendation to blunt observer effects, Practice standards for the reconstruction of crime, Science of crime reconstruction, Methods of crime reconstruction, Role of evidence in reconstruction, Time line creation, Mind mapping, Part charting (flow diagram) the crime scene, the nature of reconstruction, Evidence dynamics, Pre-discovery (offender action, victim actions, witness weather/climate, decomposition, insect activity, animal predation, fire) Post-discovery (failure to search recovery, evidence technicians, medical examiner, premature scene cleanup, packaging, transportation, storage and chain of custody). Trace evidences (fingerprint, blood and semen, hair, fibers, paint, glass, soil, dust, shoe polish, footwear and Tyre traces, GSR, Tool marks, projectile wipes, explosive residue, filaments,) Trace evidence, transfer and interpretation in CR.
Unit-II	Questioned Document: Questioned document (nature, scope, significance), Material of document (paper, ink, pencil, crayons, adhesive), Handling of Document (Integrity of Documents, Guideline for Preservation, Handling of documents, Special situation, Preservation of document), Classification and types of document (financial, academic, personnel, Historical, Official and Non-official records, Government documents, Service documents and certificates), Disputed documents-letters (Suicidal, Missing persons, Ransom and Hesitated) Financial document (Property, Money, Business, Stocks and Share), Preliminary examination of document, Handwriting (classification), development of handwriting (Childhood stage, Adolescent stage, Graphic maturity, Adult stage, Old age changes, Accidental malformation, Sign only handwriting,) Influence of (Illness, Intoxication, Physical deformities, Mechanical factor, Time span, Health, Blindness, Mental health, Drugs and medication, Alcohol and drug abuse) Principle of handwriting identification, Handwriting characteristics (Class, Individualistic, Identifying characteristics) Natural variation in writing, General and individual characteristic of handwriting, Standard document (Specimen Writing, Admitted writing, Marking of document, Instrumentation required in document examination.
Unit-III	Fingerprint: Definition, History and development, dermatoglyphics, Theory, Principles, Significance (Physical, biological and forensic), embryology (primary and secondary ridge formation) morphology and anatomy of dermal skin, Theory pattern formation, Basic fingerprint

	patterns (Arch, loop, whorl and composite), pattern area, delta and core (ridge characters) Ridge counting, Ridge tracing, Classification system in fingerprints {Ivan Vucetich, Purkinje, Francis Galton, Henry (10 digit and FBI extension)} single digit (battle), damage fingers. Taking of fingerprint: requirements, procedure, precautions, purpose, plain print, rolled print and palm print. Post-mortem fingerprinting (Fresh corpus, Rigor mortis, Mutilated, Decomposed, Drowned, Burn), Photography with various light sources, non/direct ink fingerprint, unknown latent print (known print, manual method, live scan), unknown fingerprint, condition affecting latent print, the crime scene search for fingerprint.
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Recommended Books:

S. No.	List of Books
1	The Forensic Laboratory Handbook procedure and practice Ashraf Mozayani, Carla Noziglia.
2	Crime reconstruction W. Jerry Chisum, Brent E. Turvey.
3	Practical Crime Scene Analysis and Reconstruction Ross M. Gardner and Tom Bevel.
4	Fundamental of Forensic Science Max M. Houck and Jay A. Siegel.
5	Introduction to Criminalistics Barry A.J. Fisher. William J. Tilstone.
6	Crime scene to the court the essential of forensic science, Peter White.
7	Crime scene management scene specific methods by Raul Sutton, Keith Trueman.
8	Crime scene investigation by Jaqueline T fish, Larry S. Miller,
9	Technique of crime scene investigation by Barry A J Fisher, David R. Fisher.
10	Henry lee's crime scene Handbook by Henry C Lee.
11	Suspect document, Wilson R. Harrison
12	Scientific examination of questioned documents by Jan Seaman Kelly.
13	Questioned document by Albert S. Osborn.
14	Handwriting Forensic, By Dr. B. R. Sharma.
15	Forensic document examination principle and practices by Katherine M. Koppenhaber.
16	Introduction to criminalistics by Richard Saferstein.
17	Handwriting and fingerprint analysis in criminal trail and investigation by B L Bansal and Rajiv Raheja.
18	Forensic science in criminal investigation and trail by B R Sharma.

19	Forensic Handwriting Identification fundamental concept and principle by Ron N Morris.
20	Advances in fingerprint technology, 2nd edition, Henry C Lee and R E Gaensslen.
21	Fingerprint analysis and understanding, by Mark R Hawthorne.
22	Fingerprint revolutionized with illustration by F Brewster.
23	Firearms and fingerprint by Edward Hueske
24	Fingerprint identification by SurinderNath.
25	Forensic science and its related issues by V N Sehgal and SurinderNath.

Paper-II (BFC-3T2) Advanced Forensic Chemistry

Max Marks: 50

Unit	Contents
Unit-I	Physical Chemistry: Chemical thermodynamics- Gibbs- Helmholtz's energy efficiency, entropy, work function. Chemical kinetics – Energy of activation, molecular activation-collision theory, Specific reaction rate-half-life expression. Electro chemistry: Laws of electrochemistry, Electro chemical cell, salt bridge, EMF-set up of cell –examples Daniel cell Nuclear chemistry:- Introduction, radio activity, types of radiation, properties of radiation, types of radioactive decay, units of radioactivity, Half-life, average life, radioactive dating, nuclear chain reaction. Forensic applications
Unit-II	Inorganic and separation techniques: Metal and Non Metals- Preparation, occurrence, properties, uses. Hard and soft acids and bases – definition, classifications, Principles and applications, limitation. Separation techniques: Introduction, types of separation, Paper chromatography- introduction, principle, migration parameters, types of paper chromatography, procedure and applications. Column chromatography- Introduction, principle, working, adsorbents, solvents, factors affection column efficiency. TLC (Thin Layer Chromatography)-Introduction, principle, stationary phase, mobile phase, solvent system, procedure of development, Rf value, Applications of TLC and HPTLC.
Unit-III	Spectroscopy: Ultra Violet Spectroscopy-Introduction, working, principle, instrumentation, Lamberts Beer's law, absorption of U.V

radiation, Electronic transition. Terms used in U.V. Spectroscopy- Chromophore, Auxochrome, Bathochromic shift, hypsochromic shift, Applications of U.V. Spectroscopy

Infra-Red Spectroscopy: Introduction, Principle of I.R. Spectroscopy, Fundamental modes of vibrations Types of vibrations, (Stretching, bending) Function group region, fingerprint region, stretching frequencies for different function group and bonds and examples Application of I.R. Spectroscopy

NMR- Spectroscopy: Introduction, Theory of NMR, instrumentation, working, principle, chemical shift, NMR signals equivalent and non-equivalent protons, interpretation of NMR spectra of simple compounds, Applications and Numerical problems based on NMR.

Recommended Books:

S. No.	List of Books
1	Thermodynamics for Chemists by S, Glasstone.
2	Principles of Physical Chemistry and Puri, Sharma and Pathania.
3	Advanced Inorganic Chemistry by Madan , Malik and Tuli.
4	Concise Inorganic Chemistry by J.D. Lee.
5	Qualitative Analysis by Vogel
6	Bahl and Bahl, Physical chemistry.
7	John Kenkel, Analytical Chemistry for Technicians.
8	Feigl, Spot Test in Inorganic chemistry.
9	Vogel's Qualitative Inorganic Analysis.
10	D.C. Garratt, The Quantitative Analysis of Drugs.
11	An introduction to electrochemistry by Samuel Glusstone
12	Medicinal chemistry by V. Alagarsa
13	Practical organic chemistry by Vogel's
14	Instrumental Analysis by Skoog, Holler and Crouch.
15	Physical Chemistry Parcticals by J.B. Yadav
16	Advanced practical physical chemistry by Goel.
17	Analytical Chemistry by Khopkar

Paper-III (BFC-3T3) Advanced Forensic Physics

Max Marks: 50

Unit	Contents
Unit-I	Instrumentation Electronics: Introduction to electronic components- Passive component; Resistors, Its types and Identification, Capacitors and Its classification, Inductors and Its types, Transformers and Its types. Active component; Diodes and Its identifications, Zener diode, Transistors, FET, UJT, Coding of Semiconductor devices, IC's and IC packages. Wave form Generators- Working Principle of oscillators, Wave form generators; sine, square, triangular, saw tooth. Modulation and Demodulation- Introduction to Fourier transform Amplitude Modulation; Principle, Modulation Index and Percentage modulation, Side-bands and frequency domain, Amplitude modulation circuits, amplitude demodulations. Frequency modulation; Principles, Phase modulations, side-bands modulation Index, Frequency modulations and demodulation circuit, Difference between AM and FM. Active Filters- Low pass, High pass, Band pass, All pass filters. Signal Converters- ADC, DAC and counters. Wave Shaping Circuits- Wave Clipping, Clamping circuits and Timer circuits.
Unit-II	ITransducers and Measuring Devices: Transducers -Electrical transducers, Strain Gauge, Resistance thermometer, Thermistors and its applications, Integrated Circuit Temperature Transducers, Variable Inductance Transducers, Linear Variable Differential Transducers and applications, Uses of LVDT, Capacitive Transducers, Piezo-electric transducers, Photo-Electric Transducers, Mechanical flow meter. Measuring devices - Construction and working principle of Anemometer, Power and Watt meters, TDS meters, Spectrophotometer, Rain Gauge, Metal detector, Breath Analyzer, pH meters.
Unit-III	Fundamentals of Speech Reorganization : Disciplines involved in speech recognition, Paradigm for speech recognition, Speech production and perception in human beings, speech production process, Presenting speech in the time and frequency domain, Speech sounds and features, Approaches to Automatic Speech Recognition (ASR) by machine (acoustic-phonetic, pattern recognition, artificial intelligence), Neural Networks and their application and advantages in speech recognition. Signal processing and analysis methods for Speech Recognition-

	Introductory idea about- Spectral analysis model, Linear predictive coding model, Vector quantization, Auditory- based spectral analysis model. Various voice identification software. Collection of samples and Forensic Importance of voice analysis.
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Recommended Books:

S. No.	List of Books
1	Practical Approach to Electronic Circuit Design By D. S. Mantri and G.P. Jian.
2	Electronic Principles By Albert Malvino and D. J. Bates.
3	Communication Electronic Principle and Applicatons By Frenzel.
4	Electronic Communication By Dennis Roddy and John Coolen.
5	OP-Amp and Linear Integrated Circuits By Ramakant Gaikwad.
6	Electronic Instrumentations By H. C. Kalsi.
7	Measurements, Instrumentation and Experiment Design in Physics and Engineering By Michel Sayer.
8	A course in Electrical and Electric Measurements and Instrumentation By A.K. Sawhney.
9	Criminalistics – An Introduction to Forensic Science By Richard Saferstein.
10	Fundamentals of Speech Recognition By Lawrence Rabiner and Biing- Hwang Juang.
11	The Physics of Speech By D. B. Fry
12	Applied Speech and Audio Processing By Ian McLoughlin.

Paper-IV (BFC-3T4) Advanced Forensic Biology

Max Marks: 50

Unit	Contents
Unit-I	Forensic Biology (Introduction, History and Development), Evidences Biological Importance, Nature, scope and characterization (blood, semen, vaginal fluids, saliva, urine, sweat, skin, nails, tissue, tooth, bones, uterine fluid, vomit, vitreous humor, CSF, colostrum. Botanical materials, diatoms, wild life samples and other biological evidences), Collection and preservation packaging handling transportation and maintenance of Chain of custody. Hair: Hair trichology – Collection, determination of origin, biochemistry and forensic examination (origin, nature, source, sex determination and DNA profiling) Fiber: - Types of fiber, natural (plant

	animal and mineral), synthetic (nylon, polyester, terylene, carbon nanotube fiber), and blended (terrycloth, rayon) Leather : - Animal leather, leather from endangered species and artificial leather, (examination and comparison) Paper: - Manufacturing, components, types based on source, (wood, bamboo, leaves, petals, molasses, cotton, jute), hand-made, machine made. Examination (physical, microscopic and chemical) and their significance in forensic investigations.
Unit-II	Forensic Serology: Blood: Blood (RBC, WBC and platelets) other variants of blood, blood property (physical, chemical, and biological) Synthesis of blood, blood circulatory systems (open and closed), Functions of blood, identification of blood, blood grouping systems (A, B, O systems, Rh factor), human and non-human blood, Human and Non-human Presumptive and Confirmatory Tests, Blood clotting cascade. Serological Concepts: Antigen – Antibody interaction: Strength of antigen-antibody interactions, cross reactivity. Precipitation reactions: - (Radial Immunodiffusion, Ouchterlony's double Immunodiffusion, immune -electrophoresis, rocket electrophoresis). Agglutination reactions: - (Haemagglutination, bacterial agglutination, agglutination inhibition). Immunoassay techniques: - Radioimmunoassay, ELISA, western blotting, crossover electrophoresis, immunofluorescence, flow cytometry, immune-electron microscopy.
Unit-III	Advanced Genetics: Cell division: Cell cycle, mitosis and meiosis, Structural and definitive properties of chromosomes, nomenclature of chromosomes, types of chromosomes, packaging of heredity material, concept of euchromatin and heterochromatin, chromatin modification, Human genome : genes and related sequences, non- coding sequences (interspersed and tandem repeats), human DNA polymorphism, Forensic mitochondrial analysis: Comparison of mitochondrial and nuclear DNA maternal inheritance and its genome organization. Y chromosome and gender typing. Sources of DNA evidence. DNA Extraction: Basic Principles, Method of DNA extraction (Physical, chemical and biological). DNA Quantification: Quantitative PCR assay, Slot Blot Assay, DNA data-basing Electrophoretic Methods – Agarose gel, SDS-PAGE, Native PAGE, Southern /Northern Blotting.

Recommended Books:

S. No.	List of Books
1	Forensic Biology – Richard Li
2	Fundamentals of Forensic Science- Max N Houck
3	The forensic Laboratory handbook: Procedures and Practices: Ashraf Mozayani
4	Practical Skills in Forensic Science – Alan Langford, John Dean et al
5	Fundamentals of Forensic DNA Typing – John M. Butler
6	Forensic serology and blood examination- Dr. Archana Tripathi
7	Scientific and Legal Applications of Bloodstain Pattern Interpretation – Stuart H. James
8	A laboratory manual for human blood analysis- M.K Bhasin
9	An introduction to Forensic hair examination- Shubra Gautam
10	Genetics a conceptual approach 4th edn. : Benjamin A Pierce., W. H Freeman and company, New York
11	Molecular biology: Fundamentals of molecular biology: Avinash and Kakoli Upadhyay, Himalaya Publication
12	Experimental biology a laboratory manual: Abhijeet Dutta, Narosa Publishing house
13	Cell biology, genetics, molecular biology, evolution and ecology: V.S Verma, V.K Agrawal, S.Chand and company
14	Kuby Immunology 6th edn: Kindt Goldsby, Osborne, WH Freeman and company
15	Cell biology- C.B Pawar
16	DNA Evidence and Forensic Science-David Newton
17	Fundamentals of Molecular Biology- Avinash Upadhyay
18	Cell biology- Gerald Karp.
19	The human genome source book- Tara Acharya and Neeraja Sankaran
20	Genetics – Snustad and Simmons
21	Indian Medicinal plants – Kiritkar and Basu
22	Practical Botany- Bendre

Paper-V (BFC-3T5) Advanced Forensic Psychology

Max Marks: 50

Unit	Contents
Unit-I	The Content of Forensic Psychology: - History of Forensic Psychology, Defining Forensic Psychology, Importance of Forensic Psychology, Ethical Standards of Forensic Psychology, Services provided by Forensic Psychologists, Tests that are used in Forensic Psychology for Assessment-

	Intelligence Tests, Achievement Tests, Personality Tests. Importance of statistic in Forensic Psychology, Descriptive Statistic- Measurement of central tendency (mean, median, mode). Measurement of Variability, Mean deviation, Standard Deviation (SD). Simple correlation, regression, Application of t – test and Chi square test with numerical examples.
Unit-II	Aggression and Violence: - Aggression-Definition, Nature, Types of aggression- Instrumental versus Hostile, Proactive versus Reactive, Spontaneous versus Competitive, Positive versus Negative, Thoughtful versus Thoughtless, Childhood onset and Adolescent onset. Violence-Definition, Nature of Violence-Self-directed, Interpersonal, family and community interpersonal, and Collective. Types of Violence-Physical, Sexual, Emotional, Psychological, Spiritual and Cultural. Domestic Violence-Nature of Domestic Violence, Types of Domestic Violence-Reciprocal and Non-reciprocal- Physical, Sexual, Emotional, Verbal, Economic.
Unit-III	Perspective of Criminal Behavior and Legal Proceedings: - Psychobiological Approaches, Psychological Approaches- Emotional Deprivation, Psychological Motives of Crime, Frustration, Attitudes, Peer Influence. Psychological Disorder - Psychosis, Neurosis. Social Perceptive – Differential Association theory, Labeling theory, Critical theory, Control theory. Application of Forensic Psychology in Civil and Criminal Legal Proceedings- Civil Proceedings-Domestic law and Rights of Adults, Domestic Issues in Childhood and Adolescent, Assessment of Childhood and Adolescent, Assessment of Civil Competency, Personal Injury Evaluation, Evaluation of Trauma Caused by Sexual Harassment or Rape. Criminal Proceedings-Competency to stand trial, Criminal responsibility and insanity defense, Risk assessment, Evaluation of Eyewitness testimony, Psychotherapeutic and Counseling services.

Recommended Books:

S. No.	List of Books
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1	'Handbook of Forensic Psychology', Prof Dr. Vimala Veeraraghwan, Edition 1st, 2009, Selective and Scientific Books Publications, New Delhi.
2	'Introduction to Forensic Psychology-Research and Application', Curt R. Bartol, Anne M. Bartol, Edition 2nd, 2008, Sage Publication.
3	'Handbook of Forensic Psychology', Irving B. Weiner, Allen K. Hiss, Edition 3rd, 2006, Wiley Publication.
4	'Criminology', Digumarti Bhaskara Rao, Edition 1st, 2012, Discovery Publication House PVT. LTD., New Delhi.
5	'Human Aggression-theory, research and intervention', Sunil Saini, Nilam Goyal, Edition 1st Global Vision Publication House, New Delhi.
6	'Peace Psychology', N.V. S. Suryanarayana, Neelima Vangapandu, Goteti Himabindu, Edition 1st 2011, Discovery Publication House Pvt. Ltd, New Delhi.
7	'Applied Criminology Concepts, Theories and Application', Joseph Ronald, 2013, Cyber Tech Publication, New Delhi.
8	'Research Methodology', Rita Jain, Nishith Saxena, Edition 1st, 2013, RBSA Publishers, Jaipur.
9	'Psychological Testing', Anne Anastasi, Susana Urbina, Edition 7th, 2010, PHI Learning PVT. LTD, New Delhi
10	'Experimental Psychology-A Case Approach', Robert L. Solso, M. Kimberly MacLin, Edition 7th, 2002, Pearson.
11	'Experimental Psychology', Hardeep Kaur Shergill, Edition 1st, 2012, PHI Learning PVT. LTD, New Delhi.
12	'Applied Criminology-Concept, Theories and Applications', Joseph Ronald, Edition 1st, 2013, Cyber Tech publications, New Delhi.
13	'Forensic and Criminal Psychology', Dennis Howitt, 2002 Pearson Education LTD, England.
14	'Criminology and Penology', Mittal S., Saxena S. K., [2012], Commonwealth Publishers Pvt. Ltd., New Delhi.
15	'Forensic Criminology', Petherick W. A., Turvey B. E., Ferguson C. E., [2010], Elsevier Inc.
16	'Principles Of Social Psychiatry', Craig Morgan, Dinesh Bhugra, Edition 2nd, 2010, Wiley-Blackwell Publication.
17	'Industrial Psychology', J. B. Singh, Edition 1st, 2014, Astha Publishers, New Delhi.
18	'Understanding Psychology', Robert S. Feldman, Edition 2nd, 2012, Tata McGraw-Hill Publication.
19	'Crime and Violence Against Woman', Nandita Datta, Sumitra Jha, Edition 1st, 2014, Pacific Books International, New Delhi.
20	'Psychological Interventions of Mental Disorders', S. K. Shrivastava, Nayanika Singh, Shivani Kant, Edition 1st, 2013, Sarup Book Publishers, PVT. LTD.
21	An introduction to biostatistics by Arora
22	Test, Measurement and research methods in behavioral science by A.K Singh

Paper-VI (BFC-3T6) Advanced Digital and Cyber Forensic

Max Marks: 50

Unit	Contents
Unit-I	Cyber Forensics: Introduction to Cyber forensic, Cyber forensic steps (Identification, Seizure, Acquisition, Authentication, Presentation, Preservation), Computer forensic expert, Cyber forensic investigation process, The goal of the forensic investigation, Internet usage exceeds norm, Using email inappropriately, Use of internet, email, or PC in a non-work-related manner, Theft of information, Violation of security policies or procedures, Intellectual property infractions, Electronic tampering), Establishing a basis or justification to investigate, Determine the impact of incident, Auditing V/s Cyber forensic investigations.
Unit-II	Incident Response: Introduction to incident response process, Computer security incident, Goals of incident response, Involvement in incident response process, Incident response methodology, Formulate a response strategy, Investigation of incident, Preparing for incident response, Overview of pre-incident preparation, Identifying risk after detection of an incident. Cyber Forensic Tools and Utilities: Introduction, Examining a breadth of products, Cyber forensic tools, good, better, best: Right incident response tool for organization, Tool review forensic tool kit, EnCase, Cyber check suites, Disk imaging. Specifications for forensic tools tested. Evidence collection and analysis tools, Volatile and non-volatile evidences collection (Safeback, Gettime, Filelist, Filecvr and Excel, Getfree, Swapfiles and Getswap, Getslack, Temporary files), Detailed procedures for obtaining a bit stream backup of hard drive, File system (Details of file system, Data structure of file system, Data recovery in different file system)
Unit-III	Concealment Techniques: Introduction to cryptography, Types of cryptographic algorithms (Secret key cryptography, Public key cryptography, Hash function), Electronic signature, Steganography, Reversing the steganographic process, Cloaking techniques (Data hide and seek), Renaming files, Manipulating file system, Data hiding on NTFS with alternate data stream. Advance C Programming : Array ,String ,Pointer ,Structure ,Union , File handling

Recommended Books:

S. No.	List of Books
1	Cyber Forensic a field manual for collecting ,examining and preserving evidence of computer crimes by Albert J. Menendez

2	HTML and CSS in pictures by Chris Charuhas
3	C Programming by Balaguruswamy
4	Introduction to C : Kanetkar
5	Introduction to ANSI C : Narain
6	Computer Networks by A S Tanenbaum

Paper-VII (BFC-3T7) Criminal Procedure Code

Max Marks: 50

Unit	Contents
Unit-I	Criminal justice system: Inquisitorial and adversary/accusatorial; International norms regarding the basic principles of criminal justice system; Constitutional perspectives - Articles 14, 20, 21 and 22; The rationale of criminal procedure; Salient features of the Criminal Procedure Code, 1973; The organization of police, prosecution and defense and prison authorities – duties, functions and powers; Constitution of criminal courts and the significance of the segregation of magistrates into judicial and executive magistrates categories under the code; Important definitions: Investigation, first information, complaint, inquiry, charge, trial, summons and warrant cases, discharge and acquittal, appeal, revision and reference.
Unit-II	Investigation proceedings: Initiation of investigation proceedings (Secs.154-157); Interrogation powers of police officer (Secs.160 and 161); Evidentiary value of FIR and statements made to police officer (Sec.162 of Cr. P.C.) Arrest with and without a warrant : exercise of power and execution rules (Secs.41-60 and 70-80); Preventive powers of the Police (Secs.149-153); Rights of arrested person (Secs.50,50A,54-57,75,76,303,304 of Cr. P.C and Art.22 of constitution); Search and Seizure (Secs.51,93-103, 165,166 and 166A,166B); Proclamation and attachment (Secs.82-89). Recording of confessions and statements (Sec.164); Special remand order (Sec.167); Police diary (Sec.172); Police report (Sec.173); Inquest proceedings (Secs.174-176).
Unit-III	Jurisdiction of Courts, Inquiry proceedings and Bail provisions: General principle of jurisdiction of criminal courts (Sec.177); Exceptions to the principle (Secs.178-188); Initiation of Inquiry proceedings (Secs.190-194); Exceptions to the general principle of moving criminal courts (Secs.195-199); Complaint to magistrates (Secs.200-203); Inquiry proceedings before

	magistrates (Secs.204-209); Bail provisions (Secs.436-450).
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Recommended Books:

S. No.	List of Books
1	The Constitution of India- P.M. Bakshi
2	Introduction to Constitution of India- D.D. Basu
3	The Code of Criminal Procedure- Ratanlal Dhirajlal
4	Criminal Procedure Code – Bare Act
5	Medical Jurisprudence and Toxicology by Jaysingh Modi
6	Forensic science in criminal investigation and trail by B R Sharma.

Paper-VIII (BFC-3T8) Law of Evidence

Max Marks: 50

Unit	Contents
Unit-I	Introduction: Conceptions of evidence in classical Hindu and Islamic Jurisprudence, The Introduction of the British “Principles” of evidence. The main features of the Indian Evidence Act, 1872. Applicability of evidence Act, Administrative tribunals, Industrial tribunals, Commissions of enquiry, Court-martial. Central conceptions in law of evidence:, Facts: Sec. 3 definition relevant facts/facts in issue, Evidence: Oral and documentary and real Primary and secondary evidence, Circumstantial evidence and direct and indirect Evidence-Hearsay evidence, “proving” not proved and “disproving”, Witness, appreciation of evidence Presumption (Sec. 4), The Doctrine of res gestae (Secs. 6,7,8), Test identification parade(Sec.9), Evidence of common intention (Sec. 10), The problems of relevancy of “Otherwise” irrelevant facts (Sec. 11), Proof of custom (Sec. 13), Facts concerning state of body and mind (Secs. 14,15 and 16)
Unit-II	Admissions and Confessions: General principles concerning admissions (Secs. 17-23), Differences between “Admission” and “Confession”, The problems of non-admissibility of confessions caused by , “any inducement, threat or promises” (Sec. 24), Inadmissibility of confession made before a police officer, (Sec. 25), Admissibility of “Custodial”

	confessions (Sec. 26), Admissibility of information" received from an accused person in custody, with special reference to the problem of discovery based on "joint statement" (Sec. 27), Confession by co-accused (Sec. 30), The problems with the judicial action based on a "retracted confession"
Unit-III	Statement of persons who cannot be called as witnesses: Dying declarations: The justification for reliance on dying declarations (Sec. 32), The judicial standards for appreciation of evidentiary value of dying declarations. Other statements by persons who cannot be called as witnesses, Sections 32(2) to (8) and 33: Relevance of judgments, General principles (Secs. 40-44), Admissibility of Judgments in civil and criminal matters (Sec. 43), "Fraud" and collusion" (Sec. 44); Expert testimony: General principles (Secs. 45-51), Expert, Types of expert evidence, The problems with expert testimony. Evidence of character. Oral evidence: general principles concerning Oral evidence (Secs. 59-60), Exceptions to hearsay evidence.

Recommended Books:

S. No.	List of Books
1	The Law of Evidence- Batuk Lal
2	Principles of Law and evidence- Avtar Singh
3	The Law of Evidence - Ratanlal Dhirajlal
4	Evidence Act- Bare Act
5	Medical Jurisprudence and Toxicology by Jaysingh Modi
6	Forensic science in criminal investigation and trail by B R Sharma.

SEMESTER-IV

Paper-I (BFC-4T1) Advanced Forensic Science

Max Marks: 50

Unit	Contents
Unit-I	Crime Scene Reconstruction (CSR): Theoretical and practical concept of crime scene analysis (fundamental beliefs, theories, principles of CSR,

	scientific method, facts at scene of crime and relation with evidences), practical methodology for crime scene reconstruction. Resolving significant investigative questions in CSR. Role of protocol in reconstruction. Bloodstain Pattern Analysis to crime scene reconstruction. Reconstruction using bloodstain evidences. Role of forensic pathologist/medico legal expert, the body and death scene {body examination at scene collection of biological fluids, four science of death, time of death and body changes} and scene reconstruction, medical autopsy and examination of traumatic Injury. Reconstruction of motor accident, firing, post blast cases, fire. Collection of data (videography photography, measurements, analysis of data) Writing of CSR reports, court room testimony.
Unit-II	Impression evidences: Impressions: - Poroscopy (construction, immutability, individuality, variation and reliability of pores, pores in the prints of dead person), methods of collection and recording of pore prints. Edgeoscopy (examination and significance). Palm (Volar pads, Thenar Eminence, Hypothenar, longitudinal crease, proximal and Distal transverse crease), bare foot (way of Khoji and Puggi analysis), physical features of feet (toes, ball, the arch, the heel) Gait pattern (significance and analysis), parameters in gait (direction line, walking line, foot line, foot angle, step length, step breadth, principle angle) examination and Determination (age, sex, stature, physical state). Chelioscopy (significance, morphology and anatomy of lip), Tsuchihashi classification, methods of collection and recording of lip print. Ear print (significance, morphology and anatomy of ear), Methods of collection, recording and examination of ear print.
Unit-III	Fingerprint Development: Fingerprint at crime scene (Chance, Patent, Plastic and Latent) Formation of latent Fingerprint, Morphology and anatomy of sweat gland: Eccrine gland, Sebaceous gland, Apocrine gland, Chemical constituent of sweat gland (Water, Inorganic, Organic, Metallic and Drugs Etc.) Touch DNA. Identification and individualization (Osborn Grid, Seymour Trace, Photographic Strip, Polygon, Overlay, Osterburg Grid, Microscopic triangulation and conventional method. Fingerprint Development- Physical (Regular Fingerprint powders, Traditional fingerprint Powders, Organic fingerprint powders), Luminescent (Fluorescent and Phosphorescent) Fingerprint powders metallic (Magnetic, Fine Lead, and Metal Evaporation) Chemical fuming and Enhancement (Iodine Fuming, Iodine Solution method, Cyanoacrylate, Super glue, Ninhydrin method, DFO Method, Silver nitrate method) Instrumental (Laser). Introduction digital finger print identification, Automated Fingerprint Identification System. Legal aspects of fingerprint and Court testimony.

Recommended Books:

S. No.	List of Books
1	The Forensic Laboratory Handbook procedure and practice Ashraf Mozayani, Carla Noziglia.
2	Crime reconstruction W. Jerry Chisum, Brent E. Turvey.
3	Practical Crime Scene Analysis and Reconstruction Ross M. Gardner and Tom Bevel.
4	Fundamental of Forensic Science Max M. Houck and Jay A. Siegel.
5	Introduction to Criminalistics Barry A.J. Fisher. William J. Tilstone.
6	Crime scene to the court the essential of forensic science, Peter White.
7	Crime scene management scene specific methods by Raul Sutton, Keith Trueman.
8	Crime scene investigation by Jacqueline T fish, Larry S. Miller,
9	Technique of crime scene investigation by Barry A J Fisher, David R. Fisher.
10	Henry lee's crime scene Handbook by Henry C Lee.
11	Advances in fingerprint technology, 2nd edition, Henry C Lee and R E Gaensslen.
12	Footwear impression evidence, detection, recovery and examination by William J Bodziak.
13	Bloodstain pattern analysis with introduction to crime scene reconstruction. Third edition. - Tom Bevel, Ross Gardner.
14	Forensic Science: An Introduction to Scientific and Investigative Techniques, Third Edition - Stuart H. James, Jon J. Nordby, Suzanne Bell
15	Forensic document examination principle and practices by Katherine M. Koppenhaber.
16	Introduction to criminalistics by Richard Saferstein.
17	Advances in fingerprint technology, 2nd edition, Henry C Lee and R E Gaensslen.
18	Fingerprint analysis and understanding, by Mark R Hawthorne.
10	Fingerprint revolutionized with illustration by F Brewster.
20	Firearms and fingerprint by Edward Hueske
21	Fingerprint identification by Surinder Nath.
22	Forensic science and its related issues by V N Sehgal and Surinder Nath.

Paper-II (BFC-4T2) Advanced Forensic Chemistry

Max Marks: 50

Unit	Contents
Unit-I	Qualitative-Quantitative analysis: Determination of Sulphur, Nitrogen

	and Halogens in the organic compound, Estimation of the functional groups in the organic compounds – Hydroxyl (alcoholic and phenolic) carbonyl, ester, Nitro, Amino and Carboxylic acid Oils and fats: Definition and classification of oils and fats. Analysis by physical, and chemical methods – Colour, Density, Specific gravity, Smoke point, Acid value, Peroxide value, Iodine value, Saponification value, self-stability value. Determination and significance of these aspects in quality control. Solvent Extraction -Introduction, Principle, types of extraction , factors affecting solvent extraction, percentage extracted, solvent extraction method, separation factor, batch extraction, counter current extraction, application of solvent extraction, Loss on drying, loss on ignition, residue on ignition in gravimetry, numericals.
Unit-II	Forensic Chemistry: Screening, sampling-methods: type (collection), introduction, statistical method, different standard methods, errors and precision. Inorganic analysis: – Qualitative inorganic analysis. Theoretical principles involved in separation of cations and anions into groups, reactions of cations (Pb, Hg, Ag, Cu, Cd, As, Fe, Zn, NO₂, NO₃, SO₄, SO₃, Cl, Br, I) Micro-chemical method: spot test of (Ni, Co, Fe, As, Pb and Hg) principle and procedure. Cement: Introduction, types of cements, composition, preparation by rotary Kiln method, and analysis of Portland cement by chemical method.
Unit-III	Chemistry of paints, fertilizers, drugs and alkaloids: - Paints: Introduction, constituents, functions, flash point of paints, separation of pigments, binder and thinner. Fertilizers: Introduction, classification and analysis of fertilizers, Urea, ammonium nitrate, calcium phosphate. Drug: - Introduction, effect of drug, analgesic, antipyretic and anti-inflammatory drug. Ibuprofen, aspirin, paracetamol, diclofenac, morphine, Benzodiazepines. Alkaloids: -Introduction, Isolation, Classification. Structure determination, preparation, properties and applications of Cocaine, Piperine, Nicotine, isolation and properties of Quinine, Atropine, Ephedrine. Extraction and analysis of caffeine and catechine.

Recommended Books:

S. No.	List of Books
1	Concise Inorganic Chemistry by J.D. Lee.
2	Organic Chemistry by Moris and Boyed.
3	Heterocyclic Chemistry by Gupta and Kumar Vol I and Vol II.
4	Natural Products by S.V. Bhat.

5	Qualitative Analysis by Vogel
6	Bahl and Bahl, Organic chemistry.
7	Mehta and Mehta Organic chemistry.
8	John Kenkel, Analytical Chemistry for Technicians.
9	Feigl, Spot Test in Organic chemistry.
10	Feigl, Spot Test in Inorganic chemistry.
11	Vogel's Qualitative Inorganic Analysis.
12	D.C. Garratt, The Quantitative Analysis of Drugs.
13	Organic Chemistry by S. Chand
14	Medicinal chemistry by V. Alagarsa
15	Practical organic chemistry by Vogel's
16	Instrumental Analysis by Skoog, Holler and Crouch.
17	Physical Chemistry Parcticals by J.B. Yadav

Paper-III (BFC-4T3) Advanced Forensic Physics

Max Marks: 50

Unit	Contents
Unit-I	Fire Arms and Ammunition : Fire arms - Early hand cannons, The matchlock, The wheel lock, The shaphaunce, The flintlock, The percussion system, The pin fire system, The rimfire system The Dreyse needle, Fire rifle, The centre fire system, Needle fire system, Rifling, he revolver, Pistols, Bolt action rifle, Shotgun, Sub machine gun, Machine gun, zip guns (Improved Firearms). Ammunitions - Rim fire, centre fire, Case less, Blank ammunition, Tear gas, Grenade launcher, Dummy, Primer cap types, Berdan primer, Boxer primer, Cartridge cases - Rimless, semi-rimmed, rimmed, belted. Bullet and its types, Shotgun ammunition- shotgun slugs.
Unit-II	Tools and 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 and documentation of tool marks.
Unit-III	Automobiles, Appliances and their Failure: Automobiles- Vehicles manufactured in India, Components of automobile, Chassis, body, chassis

frame, general assemblies of chassis and their functions, Various identification numbers, Head lights, Tail lights and Indicators, Types of automobiles, Technical terms- wheel base, thread width, turning radius, ground clearance, variants. Safety standards for cars, Suspension system, Steering system, Brake system and testing of brakes, Tyre and rims, Two stroke and four stroke engines and their comparison.

Appliances and Equipment Failure- Kitchen and House hold appliances like- stoves, Refrigerators, Washers / Driers, Coffee makers, Fans and Heaters, Television and VCRs. HVAC Systems like- Furnace humidifiers and Furnaces, Air conditioner, Fire places and water heaters, Pumps, generators and motors, Boilers, welding failure, swimming pool failure.

Recommended Books:

S. No.	List of Books
1	Hand book of Firearms and Ballistics By Brain J. Heard.
2	Forensic Science in Criminal Investigation and Trials By B. R. Sharma.
3	Firearms and Forensic Ballistics By S. N. Gaur and B. C. Jauhari.
4	Color Atlas of Forensic Toolmark Identification By Nicholas Petraco.
5	Basic of Automobile Engineering By C. P. Nakra.
6	Automobile Engineering Vol- I and II By K. M. Gupta.
7	Automotive Mechanics By Joseph Heitner.
8	Encyclopedia of Science and Technology, Vol-2 Tata Mc Graw-Hill.
9	Auto Design By R. B. Gupta.
10	Forensic Engineering Fundamentals By Harold Franck and Darren Frank.

Paper-IV (BFC-4T4) Advanced Forensic Biology

Max Marks: 50

Unit	Contents
Unit-I	Forensic Entomology: Different domains of entomology and forensic entomology (Introduction, history and development). Post Mortem Interval: role of entomology in determination of PMI, Introduction to insects of forensic importance:-Necrophagous Species (Sarcosaprophages {Calliphoridae, Sarcophagidae, Muscidae, and Dermestidae} Coprophages {Scarabaeidae and Muscidae} Dermatophages {Dermestidae, Tineidae.}) Necrophagous - Predaceous Species: (Ants (Formicidae), Silphid beetles, Clerid beetles) predaceous Species (Histeridae, Staphylinidae.) Parasitic Species (endoparasitic wasps) Adventive or Incidental Species: Arthropods that use carrion as a concentrated resource extension of their normal habitat e.g. spiders, centipedes, millipedes, mites etc. and their life cycle. Determination of

	PMI, Determining the age of blow fly life cycle stages by ADH/ADD/ isomegalen diagram method. Forensic zoology: (Introduction history and development), Investigation of cases where animals are used in commission of crime. examine marks on the bodies of victims and identification, examination of animal bite marks,
Unit-II	Forensic Botany: (Introduction history and development) botanical evidence encounter in forensic investigation. Identification and examination of plant derivative (leaves, flower, branches, stem, root, wood, grasses, fruits and seeds) classification of plant specimens and examination. Forensic analysis of pollen grains, algae. Investigation of ornamental, imported, stolen, endangered plants. Dendrography (sandal, teak, red sandal wood). Limnology (collection of diatoms from drowned body, collection of control sample, extraction, digestion, examination, comparison and identification. Dendrochronology, Application of plant ecology, drugs of abuse (Opium, Cannabis, from plants, their illegal farming and trading.
Unit-III	Forensic microbiology: Concept of forensic microbiology, history, introduction to epidemiology, microbial forensic programs (SWGMEG), CDC, case studies, microbes of forensic significance. Types of media: selective, differential, special. Isolation of bacteria of forensic significance, sample collection, growth conditions, and identification, Preservation methods (serial transfer, liquid nitrogen, lyophilization). Biochemical methods for identification of bacteria. Fungi: isolation and identification. Virology: Classification, Structure and cultivation of Animal, plant and human viruses. Advanced instrumentation: Principle, working, mechanism, construction, ray Diagram, application and forensic significance (biological comparison microscope) phase contrast, fluorescent, dark field, polarizing microscope, scanning electron tunneling microscope, atomic force microscope.

Recommended Books:

S. No.	List of Books
1	Basic of spectroscopy- Ball
2	Manual of clinical microbiology- Murray
3	Microbiology an introduction 9th edtn: Tortora Funke, case, Pearson
4	An introduction to Forensic Genetics 2nd edtn. William Goodwin, Wiley-Blackwel
5	Microbiology – Pelczar
6	Textbook of microbiology: 8th edtn: Ananthnarayan and Panicker
7	Roitts Essential Immunology 12th edtn: Peter Delvis, Wiley-Blackwel

8	Biotechnology expanding horizon 4th edn: B.D Singh, Kalyani Publication
9	Forensic Botany: Principles and Applications to Criminal Casework(2004) Edtd by Heather Miller Coyle, CRC press
10	Forensic Science handbook vol II 2nd edn: Richard Saferstein, Pearson
11	Forensic entomology, 2nd edn: Jason H Byrd, James L Castner, CRC press
12	Microbial Forensic (2005): Breeze, Budowle, Elsevier
13	An introduction to mycology :Alexopoulos and Mims
14	A handbook of laboratory instrumentation-Chennai GA Swami
15	Case studies in food Microbiology for food safety and quality- Rosa Pawsey
16	Practical skills in biomolecular Science- Rob reed, David Holmes

Paper-V (BFC-4T5) Advanced Forensic Psychology

Max Marks: 50

Unit	Contents
Unit-I	Social Psychology and Social Cognition: - Social Cognition, Attitude - Meaning and Nature of Attitudes-Explicit Attitudes, Implicit Attitudes. Attitude Formation – Based on Classical Conditioning, Instrumental Conditioning and Observational Learning. Persuasion- The Cognition Process- Systematic processing, Central route, Heuristic processing, peripheral route, Elaboration-Likelihood Model, Heuristic-Systematic Model. Stereotyping- Gender and Stereotyping, Stereotyping and the Glass Ceiling. Prejudice and Discrimination: The Origins of Prejudice – Direct Intergroup Conflict, Social Categorization, The Role of Social Learning, Cognitive Sources of Prejudice. Techniques to Change Prejudices- Breaking Cycle of Prejudice, Direct Intergroup Contact, Re-categorization
Unit-II	Applying Social Psychology in The Interpersonal Aspects of Legal System: - Memory and Eyewitness, Social Influence and Legal System- Police Interrogations, Lineups and Effect of Media Coverage on Perception of Defendants. Social Cognition and Legal System: Eyewitness Testimony, Errors /Problems in Eyewitness Testimony, Solutions for Increasing Eyewitness Accuracy. The Influence of Prejudice and Stereotypes On The Legal System.
Unit-III	Behavioral Abnormalities and Personality Disorders in Crime Behavioral abnormalities – Harassment and types of harassment, Bullying and types of bullying, Stalking and types of stalking. Defining and Diagnosing Personality Disorders. Odd-Eccentric Personality Disorders. Dramatic-Emotional Personality Disorders. Anxious-Fearful Personality Disorders. .

Recommended Books:

S. No.	List of Books
1	'Criminology', Ram Ahuja, 2008, Rawat Publication, Jaipur.
2	'Criminology' [2005] S. M. A. Qadri, fifth edition, EBC Publication, Lucknow.
3	'Crime Psychology', Dr. R. G. Parmar, Jignesh H. Tapariya, Edition 1st, 2010, Paradise Publishers, Jaipur.
4	'Criminology', Digumarti Bhaskara Rao, Edition 1st, 2012, Discovery Publication House PVT. LTD., New Delhi.
5	'Criminal Profiling-An Introduction to Behavioural Evidence analysis', Brent Turvey, Edition 2nd, 2006, Elsevier Academic press.
6	'Abnormal Psychology-The Problem of Maladaptive Behaviour', Irwin G. Sarson, Barbara R. Sarson, Edition 11th, 2012, PHI Publication, New Delhi.
7	'Abnormal Psychology', James N. Butcher, Susan M. Mineka, Jill M. Hooley, Edition 15th, 2014, Pearson.
8	'Criminology', Anthony Walsh, SAGE Publication, Inc.
9	'Forensic Criminology', Petherick W. A., Turvey B. E., Ferguson C. E., [2010], Elsevier Inc.
10	'Applied Criminology-Concept, Theories and Applications', Joseph Ronald, Edition 1st, 2013, Cyber Tech publications, New Delhi.
11	'Criminology', Freda Adler, Gerhard O. W. Mueller, William S. Laufer, Edition 1st, 1991, McGraw-Hill, Inc.
12	'Psychology and Crime', Nageshwar Singh, Edition 1st, 2013, RBSA Publishers, Jaipur.
13	'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [01], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
14	'Social Psychology', Robert A. Baron, Nyla R. Branscombe, Donn Byrne, Gopa Bhardwaj, Edition 12th, 2010 Pearson Publication.
15	'Social Psychology', Baron R. A., Branscombe N. R., Byrne D., Bhardwaj G., [2009], Twelfth Edition, Pearson Education.
16	'Social Psychology: Exploring Universals Across Cultures' Fathali M. Hogg (1998), W.H. Freeman and Company, New York.

Paper-VI (BFC-4T6) Advanced Digital and Cyber Forensic

Max Marks: 50

Unit	Contents
Unit-I	Biometrics: Introduction to biometrics, , Various types of biometric methods, Characteristics of biometrics, Advantages and disadvantages General Biometric System (Identification and Verification), General architecture comparison of different biometric technologies, difficulties in implementation of biometrics, Applications of biometrics.

Unit-II	Data Communication: Data transmission mode, Transmission media, Digital and Analog data transmission, Switching techniques, Network types, Network topology, Communication protocols. Security: Threats, Vulnerabilities, Access control, Virus, Trojans, Security plan and policies. Business Data Processing: Introduction to data processing, Data storage hierarchy, Standard method of organizing data, File management system. Database Management System (DBMS): Database model ,Component Of DBMS-SQL
Unit-III	Multimedia: Introduction to multimedia, Multimedia components (text, graphics, animation, audio, video) Multimedia Applications. MATLAB : Introduction to MATLAB, Features of MATLAB, Understanding the MATLAB Environment, Commonly used operators and Special Characters, Special variables and Constants ,Command, M-Files Data Type , Conditional statements , Loops , Vectors , Matrices , Colon notation ,Numbers , String , Functions ,Data import , Data output/export.

Recommended Books:

S. No.	List of Books
1.	Handbook of Biometrics by A.K. Jain
2.	Understanding the MATLAB by R.R. Manza
3.	Digital Image processing using MATLAB by Gonzales
4.	HTML and CSS in pictures by Chris Charuhas
5.	C Programming by Balaguruswamy
6.	Introduction to C : Kanetkar

Paper-VII (BFC-4T7) Criminal Procedure Code

Max Marks: 50

Unit	Contents
Unit-I	Trail Proceedings: Concept of fair trial; Presumption of innocence, Right of silence and right to speedy trial; Charge: Content and form (Secs.211-217); General principle to be tried separately for every charge and its exceptions (Secs.218-224); Trial before a court of session (Secs.225-237); Trial of warrant cases before magistrates (Secs.238-250); Trial of summons cases (Secs.251-265); Summary trials (Secs.260-265);Pleas and limitations to bar trial: Principle of Autrefois acquit and autrefois convict (Secs.300 and Art20); Compounding of offences (Sec.320); Withdrawal from prosecution (Sec.321); Irregular proceedings (Secs.461,462 and 479); Limitations to take cognizance of offences (Secs.467-473); Evidence in inquires and trials (Secs.272-283); Tender of pardon (Secs.307-309); Provisions as to accused persons of unsound mind (Secs.328-339)

Unit-II	Judgment, Appeals, Reference, Revision and Execution: Judgment: Mode and other provisions (Secs.353-365); Confirmation of death sentence (Secs.366-371); Appeals (Secs.372-394); Reference and Revision (Secs.395-405); Transfer of criminal cases (Secs.406-412); Execution, suspension, remission and commutation of sentences (Secs.413-435) Reforms in Criminal Procedure: Major recommendations made in the Mallimath Committee, 2002 in relation to Criminal Procedure Code; The Code of Criminal Procedure Code (Amendment) Act, 2005 – important changes; The Code of Criminal Procedure Code (Amendment) Act 2006 – significant changes.
Unit-III	Juvenile Justice System: Concept of juvenile justice; Historical perspective of juvenile justice system; Provisions relating to juvenile offenders under IPC(Secs.82and83) and Criminal Procedure Code(Secs.27and260); Juvenile Justice Act, 1986 – Distinction between juvenile offender and neglected juvenile; Constitution of Child welfare boards and juvenile courts; Observation and juvenile homes; Powers of the State Government to constitute Advisory Boards and release the juvenile from juvenile or special home; Juvenile Justice (Amendment) Act, 2000 – major changes made to the JJ Act, 1986; Probation of offenders and parole: Concept of probation; Development of probation system in India; Probation of offenders Act 1958: Salient features; Role of probation officers; Role of Judiciary in the implementation of the act; Parole system: Concept and distinction with the probation system

Recommended Books:

S. No.	List of Books
1.	Forensic science in criminal investigation and trail by B R Sharma.
2.	The Constitution of India- P.M. Bakshi
3.	Introduction to Constitution of India- D.D. Basu
4.	The Code of Criminal Procedure- RatanlalDhirajlal
5.	Criminal Procedure Code – Bare Act

Paper-VIII (BFC-4T8) Law of Evidence

Max Marks: 50

Unit	Contents
Unit-I	Documentary evidence: General principles concerning documentary evidence, primary and secondary evidence, (Secs. 61-66) Public document and private document (Secs. 74-78). General principles regarding exclusion of oral by documentary evidence.(Secs. 91-92) attested documents (Secs. 67-72) Ambiguous documents (Secs.93-100) presumptions regarding documents (Secs. 79-90)

Unit-II	Of Witnesses: Competency and compellability of witnesses, Examination of witnesses, Competency to testify (Secs. 118-122), Privileges of communications: matrimonial privileges (Secs. 122) State Privilege (Sec. 123), Professional privilege (Secs. 126, 127, 128), Accomplice (Sec. 133), General Principles of Examination (Secs. 135-166), Leading Questions (Secs. 141-143), Lawful Questions in Cross-Examination (Sec. 146), Hostile witness (Sec. 154), Impeaching of the standing the credit of witnesses (Sec. 155), refreshing the memory (Sec. 164)
Unit-III	Burden of proof: The general conception of burden of proof (Secs. 101-104), General and Special Exceptions to burden of proof, Presumption as to dowry death (Secs. 113-B), The Scope of the doctrine of judicial notice (Secs. 56-57) Facts admitted need not be proved (Sec. 58) Estoppel, res judicata and waiver; and presumption, promissory estoppel, (Secs. 115-117) Improper admission and of witness in civil and criminal cases. (Sec. 167) Law reform: Amendment to Indian Evidence Act by the IT Act, 2000.

Recommended Books:

S. No.	List of Books
1.	Forensic science in criminal investigation and trail by B R Sharma.
2.	The Law of Evidence- Batuk Lal
3.	The Law of Evidence- Ratanlal and Dhirajlal
4.	Evidence Act- Bare Act
5.	Information Technology Act- 2000 Bare Act

PRACTICAL PAPERS (SEMESTER III AND IV)

***Practical examination for Semester III and Semester IV will be conducted annually for 50 marks. However, practical has to be conducted from the given list. In each semester, at least six (06) practical must be performed and certified by the Instructor.

Practical Paper I - (BFC-4P1)

(Practical based on Theory papers BFS-3T1 and BFS-4T1)

Advanced Forensic Science

Max Marks: - 50

Sr. No	Semester: -III List of experiments based on theory paper BFC-3T1
1.	Reconstruct the crime (homicide, suicide, theft, robbery, sexual assault, firearms cases).
2.	Examination of soil samples using soil testing kit.
3.	Collection and identification hair trace evidence.
4.	Determination of the medullary index of human hair and animal hair.
5.	Examination of the cross section characteristics of various body hairs.

6.	Determination of scale count and scale index of body hair.
7.	Identification of hair subjected to chemical process (dyes and bleach).
8.	Taking rolled and plain fingerprint for ten digit classification.
9.	Collection and identification of fingerprint pattern.
10.	Chemical analysis of fingerprint residues.
11.	Study of palm prints and characteristic features.
12.	Collection and examination of shoe polish traces.
13.	Collection and examination paint chip by Raman spectroscopy.
14.	Examination paint chip by stereo microscope.
15.	Collection and examination blood stain.
16.	To study crime scene reconstruction methods.
17.	To perform rough/ final sketching of crime scene
18.	Study the effect of various conditions on the development of latent prints.
19.	Collection, Handling and preservation of documents.
20.	To study the instruments used in document examination.
21.	To perform Preliminary examination of document.
22.	Examination and Identification of Childhood Stage Handwriting.
23.	Examination and Identification of Adult Stage Handwriting.
24.	Examination and Identification of old Stage Handwriting.
25.	To study Influence of Illness, Intoxication, Mechanical Factor on handwriting.
26.	To study natural variation of handwriting.
27.	Examination and identification of general and individual characteristics of handwriting.

Sr. No	Semester: -IV List of experiments based on theory paper BFC-4T1
1.	Reconstruction of crime scene based on case studies.
2.	Reconstruction of events using scientific methods
3.	Crime scene investigation of a disturbed scene.
4.	Reconstruction of a crime scene based on photographic evidences.
5.	Reconstruction of an old crime scene.
6.	Analysis of blood stain patterns.
7.	Development of fingerprint using physical methods.
8.	Development of fingerprint using Iodine/Ninhydrin/Silver nitrate/Cyanoacrylate methods.
9.	Development of fingerprints on super glue method.
10.	Development of fingerprint from challenging surfaces (thermal papers, cello tape etc)
11.	Development of plastic prints using chemical/physical methods
12.	Enhancement of developed fingerprints using light sources.
13.	Photography of fingerprints.
14.	Identification through poroscopy examination using capture unit.
15.	Identification through Edgeoscopy using fingerprint capture unit.
16.	Characteristic identification of lip prints.
17.	Gait analysis with respect to height, weight and mental condition.
18.	Examination of bare foot print.
19.	Characteristic features and identification through ear prints.
20.	Study the effect of various conditions on latent prints and their development.
21.	Reconstruction of crime scene based on case studies.
22.	Reconstruction of events using scientific methods

23.	Reconstruction of a crime scene based on photographic evidences.
24.	Analysis of blood stains.

Practical Paper II - (BFC-4P2)
(Practical based on Theory papers BFS-3T2 and BFS-4T2)
Advanced Forensic Chemistry

Max Marks: - 50

Sr. No	Semester: -III List of experiments based on theory paper BFC-3T2
1.	To determine strength of given strong acid using strong base conductometrically.
2.	To determine strength of weak acid using strong base conductometrically.
3.	To determine strength of given strong acid using strong base using pH-meter
4.	To determine strength of given weak acid using weak base using pH-meter.
5.	To study the effect of acid strength on the hydrolysis of an ester(chemical kinetic experiment)
6.	To determine the specific reaction rate of the hydrolysis of methyl/ ethyl acetate catalyzed by hydrogen ion at room temperature. (chemical kinetic experiment)
7.	To prepare bromo derivative of phenol and confirmation by TLC / MP.
8.	To prepare acetyl derivative of aniline and confirmation by TLC / MP.
9.	To verify Lambert- Beers law using KMNO ₄ solution.(colorimetrically)
10.	To verify Lambert- Beers law using methylene blue solution. (spectrophotometrically)
11.	Semi micro detection of cations and anions from given mixture – Nos. 5.

Sr. No	Semester: -IV List of experiments based on theory paper BFC-4T2
1.	To estimate the amount of amide group by hydrolysis.
2.	To estimate the amount of nitro group by reduction.
3.	Detection of S, N, halogens in organic compounds. – Nos. 4
4.	Extraction of nicotine from tobacco and analysis by FTIR.
5.	To determine moisture, ash content in coal by Muffle Furnace.
6.	Extraction of solvent from given sample by using vacuum evaporator.
7.	Analysis of fertilizer by FTIR and chemical test.
8.	To estimate amount of nickel/ zinc/ lead from given solution volumetrically. Nos. 3
9.	To determine saponification value of oil/ fat.
10.	Identification of organic compounds (characterization) by chemical test. Nos. 3

Practical Paper III - (BFC-4P3)
(Practical based on Theory papers BFS-3T3 and BFS-4T3)
Advanced Forensic Physics

Max Marks: - 50

Sr. No	Semester: -III List of experiments based on theory paper BFC-3T3
1.	Testing of various electronic components and circuits.
2.	Waveform generator
3.	Study of AM / FM modulation
4.	Study of low pass, High Pass and Band Pass Active filters
5.	Analog to Digital Convertor

6.	Digital to Analog Converter
7.	Fourier transforms
8.	Study of Wave clipping and Clamping using circuits.
9.	Digital counter
10.	Study of Timer circuits.
11.	Photosensitive relay using LDR
12.	Study of absorption / transmission coefficient of a given Sample.
13.	Thermistor characteristics / Thermocouple.
14.	Investigations of fake documents using UV light.
15.	Wind velocity measurement.
16.	Rain fall measurement.
17.	TDS measurements of various water samples.
18.	Ph measurement of samples.
19.	Detection of metallic samples using metal scanner.
20.	Segregation of Speech Sample
21.	Voice analysis by repetitive hearing.
22.	Testing of various electronic components and circuits.

Sr. No	Semester: -IV List of experiments based on theory paper BFC-4T3
1.	Wheel base and thread width measurement of various vehicles.
2.	Comparative study of technical specifications of various vehicles.
3.	Examination of Fire Arm according to Arms Act.
4.	Dismantling and assembling of firearms.
5.	Examination of fired bullet and identification by comparing with standard data sheet.
6.	Examination of firing pin marks on bullet.
7.	Examination of cartridge case for chamber, ejector, and extractor marks.
8.	Comparison of bullet, cartridge, pellets by ballistic comparison microscope.
9.	Barrel wash test.
10.	Determination of Trigger pulls of fire arm.
11.	Identification of tool using standard data sheet.
12.	Searching of tool marks, and photography of tool marks.
13.	Lifting of tool marks (casting method)
14.	Examination of tool marks and identification of tool.
15.	Physical matching of broken tool.
16.	Comparison of tool and tool marks under comparison microscope.
17.	Examination of structural properties tools by Comparison Microscope.
18.	Analysis of trace tool evidence.
19.	Examination of automobile chassis.
20.	Examination of braking system.
21.	Examination two and four stroke engines.
22.	Examination of stoves/refrigerators/fans/heater.

Practical Paper IV - (BFC-4P4)

(Practical based on Theory papers BFS-3T4 and BFS-4T4)

Advanced Forensic Biology

Max Marks: - 50

Sr. No	Semester: -III List of experiments based on theory paper BFC-3T4
1.	Microscopic examination of Human / animal Hair

2.	Examination of Cotton/Jute/Coir/Silk/Rayon/Nylon fibre/terrycot (Burning test, twist on drying, floatation test, UV test)
3.	Hair analysis by Raman spectrometer
4.	Histological examination of tissues
5.	Microscopic comparison of Human and animal blood
6.	Study of physical and microscopic properties of paper/pulp
7.	Presumptive Tests for Blood: (Phenolphthalein Assay, Benzidine, Leucomalachite Green (LMG), Luminol Test)
8.	Confirmatory Tests for Blood □ Crystallization Assays : Teichmann and Takayama
9.	Detection of α -Amylase activity a. Starch-Iodine Assay b. Quantification of Amylase using Radial Immunodiffusion Assay
10.	DNA extraction from bacteria/ yeast/ human origin
11.	DNA / RNA quantification by UV-Vis spectrophotometer / DPA / Orcinol
12.	Working with vertical and horizontal electrophoretic apparatus

Sr. No	Semester: -IV List of experiments based on theory paper BFC-4T4
1.	Comparison of Hair and fiber samples using comparison microscope
2.	Quantification of antigen by Radial immunodiffusion
3.	Collection of forensically significant arthropods
4.	Study of life cycle of blow flies
5.	Isolation of microorganisms using selective/differential media
6.	Isolation of bacteria using air sampler
7.	Isolation of microorganisms from spoiled food
8.	Isolation of fungi from soil
9.	Species Identification from various biological fluids a. Electrophoresis b. Precipitin tests c. Acid Phosphatase test for semen d. Prostate Specific Antigen (PSA)
10.	Microscopic examination for spermatozoa
11.	Examination of pollen grains using comparison microscope
12.	Study of different algae and diatoms using comparison microscope
13.	Examination of different types of woods(hard wood, soft wood)
14.	Identification of various ornamental plants
15.	Study of plants as a source of drug abuse

Practical Paper V - (BFC-4P5)

(Practical based on Theory papers BFS-3T5 and BFS-4T5)

Advanced Forensic Psychology

Max Marks: - 50

Sr. No	Semester: -III List of experiments based on theory paper BFC-3T5
1	Standard progressive matrices- J. Raven, J.C. Raven and J. H. Court
2	Locus of Control
3	Reaction time
4	Indian adaptation of Bell's Adjustment inventory- Sharma L.
5	Social Adjustment Inventory- R. C. Deva
6	Life satisfaction scale- Q.G. Alam, RamjiShrivastava

7	Observation and Testimony
8	Koh's block design test
9	Bhatia's Battery of Intelligence
10	Medico Psychological Questionnaire-J. Bharatraj

Sr. No	Semester: -IV List of experiments based on theory paper BFC-4T5
1	Emotional Maturity Scale. Dr. Yashvir Singh and Dr. Manesh Bhargav.
2	Introvert and Extrovert test – Neiman Kostalt
3	Achievement motivation- Deo Mohan
4	Children's Apperception Test – Leopold Bellak
5	Level of Aspiration – Dr. Chandra BhalDwivedi.
6	Aggression test – C.G. Pati
7	Culture fair intelligence test
8	State trait anxiety inventory for children- Charles D., Spielberger
9	Religiosity Scale – Dr. L I Bhushan
10	Self-Confidence Inventory –Dr. RekhaAgnihotri

Practical Paper VI - (BFC-4P6)
(Practical based on Theory papers BFS-3T6 and BFS-4T6)
Advanced Digital and Cyber Forensics

Max Marks: - 50

Sr. No	Semester: -III List of experiments based on theory paper BFC-3T6
1.	Identification , Seizure ,Search of Digital media
2.	Evidence Collection
3.	Demonstration of various Forensic tools like Partition magic, Encase FTK etc.
4.	Data Recovery, Deleted File Recovery viewing small Disk.
5.	Viewing small disk MBR.
6.	Demonstration of Concealment Techniques (Cryptography PGP)
7.	Demonstration of Concealment Techniques (Steganography)
8.	Demonstration of other Concealment Techniques
9.	Formatting NTFS and EX2, EX3.
10	Write a program in C to Calculate Addition of Three Numbers.
11	Write a program in C to Calculate Average of Five Numbers.
12	Write a program in C to Find Smallest Number In between Three Numbers
13	Write a program in C to Find Even and Odd Number In between 1 to 30
14	Write a program in C to Calculate Factorial of Given numbers using Function
15	Write a program in C to find square root of Given square number.
16	Write a program in C to Calculate Addition of 2 by 2 Matrix.
17	Write a program in C to create Structure of Book.
18	Write a program in C to create Structure of Student and its array.
19	Write a program in C Write and Display a file using open function.

Sr. No	Semester: -IV List of experiments based on theory paper BFC-4T6
1.	Basics MATLAB commands
2.	Perform on The MATLAB mathematical function
3.	Create a one-dimensional array named as A of size 10. Initialize elements in

	array A by colon (:) operator.
4.	Create two-dimensional array B of size 5 X 5, having all elements 1 and array B of size 4 X 4 having all elements equal to 0's.
5.	Write a program to input two numbers from user and find out the largest and smallest no.
6.	Write a program to read and display contents of two a dimensional matrix named as M of size 3 x 4 using for loop.
7.	Write a program to read seat no. and percentage of 10 students and find out no. of students got more than 60 %.
8.	MySql 5.Installation
9.	SQL Commands DDL
10.	SQL Commands DML
11.	SQL Commands TCL
12.	Conversion of file formats(wave to mp3, avi, wmpetc)
13.	Conversion of Video file format (HD video 3GP and viceversa)
14.	Creation of GIF files
15.	Biometric case studies

*****End of the syllabus*****

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**DR. BABASAHEB AMBEDKAR MARATHWADA
UNIVERSITY, AURANGABAD**

**Syllabus of
B.Sc. Forensic Science and Cyber Security
Third Year**

Three Year Degree Program

Semester Pattern

Semester V and VI

**Effective from
Academic year 2021-22 onwards**

General curriculum pattern of the program

*****Practical examination for Semester V and Semester VI will be conducted annually for 50 marks. The concerned departments are advised to conduct maximum number of experiments from the list provided and also other experiments related to theory syllabi having forensic importance. Minimum 12 experiments shall be reported in the journal for the purpose of certification.**

Konkrete

Detailed Curriculum structure and marking scheme for theory and practical papers for semester-V and VI

Curriculum structure and marking scheme of theory papers

Semester-V

Course Code	Paper No.	Title of the Paper	Marks
BFC-5T1	I	Applied Forensic Science	50
BFC-5T2	II	Applied Forensic Chemistry	50
BFC-5T3	III	Applied Forensic Physics	50
BFC-5T4	IV	Applied Forensic Biology	50
BFC-5T5	V	Applied Forensic Psychology	50
BFC-5T6	VI	Cyber Security	50

Semester-VI

BFC-6T1	I	Applied Forensic Science	50
BFC-6T2	II	Applied Forensic Chemistry	50
BFC-6T3	III	Applied Forensic Physics	50
BFC-6T4	IV	Applied Forensic Biology	50
BFC-6T5	V	Applied Forensic Psychology	50
BFC-6T6	VI	Cyber Security	50

Curriculum structure and marking scheme of practical papers

Semester-V and VI (annual examination)

Course Code	Paper No.	Title of the Paper	Marks
BFC-6P1	I	Practical based on papers BFC-5T1 and BFC-6T1	50
BFC-6P2	II	Practical based on papers BFC-5T2 and BFC-6T2	50
BFC-6P3	III	Practical based on papers BFC-5T3 and BFC-6T3	50
BFC-6P4	IV	Practical based on papers BFC-5T4 and BFC-6T4	50
BFC-6P5	V	Practical based on papers BFC-5T5 and BFC-6T5	50
BFC-6P6	VI	Practical based on papers BFC-5T6 and BFC-6T6	50

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3/12/22

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Examination pattern for theory and practical

The course of study for the B.Sc. Forensic Science and Cyber Security examination is divided into six semesters. Semester I, II, III, IV will have eight theory papers each of 50 marks while V and VI semester will have six papers each of 50 marks. There will be one practical paper for papers I to VI to be completed in a year and the examination of practical paper will be conducted at the end of even semesters. Each practical paper will carry 50 marks. Theory examination will be of 1.30 hours duration and practical examination will be of 3 hours duration.

Structure of Class and practical examination

Maximum number of students in a class for theory and practical will be as per the prevailing rules of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Standard of Passing and Award of Division

- (a) A candidate who secures minimum 40% of the marks in each subject/paper will be declared to have passed the examination.
- (b) A candidate who secures 50% or more but less than 60% of the aggregate marks prescribed for all the semester (i.e. six semesters) shall be awarded a second Division.
- (c) A candidate who secures an aggregate of 60% but less than 70% marks on the whole shall be declared to have passed the examination in first class.
- (d) A candidate who secures an aggregate of 70% and above marks on the whole shall be declared to have passed the examinations with Distinction.
- (e) A candidate who has failed in theory paper(s) at the third year (Semester V) examination shall be permitted to clear those papers along with third year (Semester VI) examination.

SEMESTER-V

Paper-I (BFC-5T1) Applied Forensic Science

Max Marks: 50

Unit	Contents
Unit-I	Forensic Anthropology: Introduction and scope of Forensic Anthropology, Human Osteology: Bone physiology and structure, the human skeleton. Recovery and collection of skeletal remains and associated evidence, preservation of skeletal remains. Personal Identification from skeletal remains: origin of the remains (human/animal), number of individuals represented by the remains, estimation of age, sex, ancestry and stature, determination of individual characteristics. Forensic Dentistry: Human dentition. Dental numbering system. History of dental identification, ABFO guidelines and standards. Bite mark

	impressions and its forensic significance.
Unit-II	Forensic Medicine-I: Introduction and scope of forensic medicine, historical perspectives of forensic medicine: global and Indian scenario, Legal aspects in view of forensic medicine: Inquest, exhumation, dying declaration, dying deposition, medical certificates, medical report, postmortem reports. Death: definition and types, modes of death, stages of death-somatic death and molecular death, signs of death, changes after death: early changes- Algor mortis, rigor mortis, cadaveric spasm, heat stiffening, cold stiffening, changes in blood, chemical changes in cerebrospinal fluid, changes in vitreous humor, post mortem lividity, fluidity of blood, late changes- putrefaction- external and internal changes, adipocere, mummification, destruction of body and tissues by maggots and other insects. Medico legal aspects of death. Violent asphyxial deaths: Hanging, Strangulation, throttling, suffocation and drowning.
Unit-III	Quality management and Expert testimony: Introduction and requirements of quality management systems for forensic science laboratories, Accreditation: introduction and objectives, organizations and certifying bodies (NABL, ILAC, APLAC), Requirements as per ISO/IEC 17025:2005 or ISO 15189:2007 for accreditation of laboratory. Proficiency testing. Measurement of uncertainty. Internal audit and Laboratory Information Management Systems (LIMS). Expert testimony: definition of expert, writing report and presentation of evidence in court of law, examination-in-chief, cross-examination and re-examination.

Suggested readings:

1. Textbook of Forensic Medicine and Toxicology, Nageshkumar G Rao, Jaypee Publishers, 1999.
2. Textbook of Forensic Medicine and Toxicology, Anil Aggrawal, Avichal Publishing Company, 2014.
3. International Standard on General requirements for the competence of testing and calibration laboratories, 1st Ed., 1999-12-15, ISO/IEC 17025:1999(E).
4. Fundamentals of Forensic Science, Max M. Houck, Jay A. Siegel, Academic Press Publishers, 2010.
5. Introduction to Forensic Anthropology, Steven N. Byers, Pearson/Allyn and Bacon, 2011.
6. Forensic Anthropology Laboratory Manual, Steven N. Byers, Pearson Education, USA, 2011.
7. Forensic Anthropology: Current Methods and Practice, Angi M. Christensen, Nicholas V. Passalacqua and Eric J. Bartelink, Academic Press, USA, 2014.
8. Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology: C. K. Parikh, CBS Publishers & Distributors Pvt. Ltd., India, 1999
9. Forensic Medicine: Guharaj, P. V., Chandran M. R, 2nd Ed., Universities Press (India) Pvt. Ltd., Hyderabad, 2006
10. Fundamental of Forensic Anthropology, Linda L. Klepinger, A John Wiley and Sons Inc. Publishers, USA, 2006.

11. Forensic recovery of human remains : archaeological approaches, Tosha L. Dupras, John J. Schultz, Sandra M. Wheeler and Lana J. Williams, CRC Press, USA, 2011.
12. The use of forensic anthropology, Robert B. Pickering and David Bachman, CRC Press, USA, 2009.
13. Forensic Anthropology Training Manual, Karen Ramey Burns, Pearson Education, USA 2013. Specific Guidelines for Accreditation of Forensic Science Laboratories and Checklist for Assessors, National Accreditation Board for Testing and Calibration Laboratories (NABL 113).

Paper-II (BFC-5T2) Applied Forensic Chemistry

Max Marks: 50

Unit	Contents
Unit-I	Separation and detection technique Gas chromatography: principles, instrumentations and working technique, columns, stationary phases, detectors, Forensic applications and limitations HPLC: Introduction, principle, Instrumentation, working, types of column, detectors, Forensic applications and limitations. Atomic Absorption Spectroscopy- Introduction, principles, Instrumentation and working, cathode lamp, monochromator, detectors, Forensic applications and limitations Flame spectrometry- Principle, Instrumentation and working, Forensic applications and limitations Thermal methods-TGA, DTA, DSC- introduction, instrumentation, working, Forensic applications and limitations
Unit-II	Forensic Toxicology Introduction to toxicology, different branches of toxicology, concepts of forensic toxicology. Scope and application forensic toxicology. Poisons: General classification of poisons, classification on the basis of occurrence, natural availability, chemical nature, mode of action. Plant, Animal Poison, Metallic Poison, types of poisoning, collection and preservation of toxicological exhibits in fatal and survival cases, signs and symptoms of poisoning, mode of action and its effect on vital functions, medico-legal and post mortem examination report/finding studies, specific analysis plan/ approach to toxicological examination of poisoning samples, excretion of poisons, detection of poisons on the basis of their metabolic studies, interpretation of analytical data and forming of opinion Terpenoids:- i) Introduction, Isolation, Classification. ii) Structure determination, preparation, properties and applications of - Citral, Geraniol, limonene, menthol, alpha-pinene, camphor.
Unit-III	Polymers Polymers-Introduction-General idea of structures, types, polymerization processes with examples, radical and ionic mechanism of polymerization, characteristic properties of polymers, Structure, preparation and applications of Polyethylene (types and Ziegler-Natta process), Teflon, PVC, Polystyrene, General idea of plasticizers, stabilizers, fillers, Epoxy

Resins, Feviseal.

Plastics- Classification of plastics, application of plastics.

Rubber- types of rubber, vulcanization of rubber, synthetic rubbers,

Fibres: (synthetic fibres)-preparation, classification and properties of polyamides-Nylon, polyesters-Terylene or Dacron.

Relevant provisions of:

The Poisons Act, 1919, and Section 284 of IPC, 1860 (Negligent conduct with respect to poisonous substance).

Explosives Act 1984, (Definition, Powers of Central Govt. and Licensing Authority, Offences and Penalties) and Section 286 of IPC, 1860, (Negligent conduct with respect to explosive substance),

Explosive Substances Act 1908, (Definition, Offences and Penalties).

Suggested Readings:

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
2. S. N. Tiwari, Analytical Toxicology, Govt. of India publications, New Delhi 1987
3. Brown P. R., Advance in Chromatography.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Bahl and Bahl, Organic chemistry.
6. Bahl and Bahl, Physical chemistry.
7. Mehta and Mehta Organic chemistry.
8. S.V.Bhat Natural Product. John Kenkel, Analytical Chemistry for Technicians.
9. Feigl, Spot Test in Organic chemistry.
10. Feigl, Spot Test in Inorganic chemistry.
11. Vogel's Qualitative Inorganic Analysis.
12. D.C. Garratt, The Quantitative Analysis of Drugs.
13. Howard: Forensics Analysis by Gas Chromatography.
14. Yinon: Forensic Application of Mass Spectroscopy 1994.
15. Prakash M. et.al; Methods in Toxicology Anmol Publication, New Delhi (1998)
16. Parikh C.K.; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi (1999)
17. Balraj S. Parmar et.al; Pesticide Formulation, CBS Publishers, New Delhi (2004)
18. Casarett & Doll Toxicology, The basic Science of Poisons
19. Curry A. S., Poison Detection in Human Organs 1976
20. Curry : Analytical Method in Human Toxicology 1986.
21. Lee and Gaensslem.: Advances in Forensic Science (Vol. 2) Instrumental Analysis.
22. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
23. Serope Kalpakjian, Steven R Schmid. "Manufacturing Engineering and Technology"
24. International edition. 4th Ed. Prentice Hall, Inc. 2001. ISBN 0-13-017440-8.
25. Hans-J. Koslowski. "Dictionary of Man-made fibers". Second edition. Deutscher Fachverlag.2009.
26. Borrow: Molecular Spectroscopy 1980.
27. Willard H. H. et. al : Instrumental Methods of Analysis 1974.
28. Moonesens A. A. et. al. : Scientific Evidence in Criminal Cases 1973.
29. Lundquist and Curry: Methods of Forensic Sciences 1963.
30. Holfmann, F. G., Hand book of drug and alcohol abuse.

31. Arena Poisoning, Chemistry Symptoms and treatment,
32. Analysis of Plant Poisons, Dr. M P Goutam.
33. Drug Abuse Handbook, Karch.s.
34. Constitution of India
35. Indian Evidence Act.
36. Criminal Procedure code
37. Indian Penal Code.
38. Bare Acts with short notes on the following : Narcotic Drugs & Psychotropic Substances Act,
39. Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act
40. Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act,
41. Wild Life Protection Act

Paper-III (BFC-5T3) Applied Forensic Physics

Max Marks: 50

Unit	Contents
Unit-I	Experimental Techniques- Forensic 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. Magnetic Measurements: Magnetic susceptibility and it's measurement by Quinck's and Gouy's method, Hall Effect and related measurements. Electrical Measurements: Resistivity measurement of thin samples by Four probe method, bulk samples by Van-der Pauw method, Resistivity measurement of electrical wires and cables and forensic examination for their source identification, Forensic examination of tampered electric energy meters and various tampering mechanisms adopted by criminals, FET and study of its characteristics, Optical fiber communication system. Radiation Detection and measurements: Working principle of Ionization chamber, Proportional counter, Geiger Muller counter, Scintillation counter, Solid State Transducer. Radiation dose and it's unit, Exposure, absorbed and dose equivalent rate and calculation of exposure and dose, Dose rates from natural and man-made sources, Radiation permissible limits, Shielding of radioactive sources. X-Ray measurements: X-Ray diffraction and crystallography, Brag's condition, Laue method, Debye- Scherrer method, Miller indices, plane spacing, Powder diffraction spectra and analysis, General analysis for cubic structures, X-ray density, Accurate measurement of cell dimensions.
Unit-II	Causes and Investigation of Vehicular Accidents- Road Terminologies: Cut, Final Grade, Surface, Existing Grade, Fill, Sub grade, Base, Traffic lane, Travelled way, Shoulders, Roadbed, Roadway, Roadway ditch, Ditch slope, Back slope, Fill slope, Interceptor ditch, Slope ratio, Central line, Crown, Super elevation, Road dividers. Road signs, symbols and traffic control mechanisms.

	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, vehicle condition, vehicle speed and damage, types of skid marks, curved scuffmarks, speed estimation from skid/scuffmarks. Time and distance, reaction time and peripheral vision of a driver, Photography and plans, Brake system and Steering failure, Motor vehicle examination. Rail Accidents: Investigation of rail crash: Criminal and safety investigation, Investigation principles, Best Practices: rail company tests, inspection of driving cab, examination of electrical/ electronic/ technological system and their failure. Necessary equipments required for forensic examination.
Unit-III	Elementary Ballistics- General- Energy considerations, Propellants, Initiation, Combustion of propellants, Density of loading, Atmospheric temperature, Shape of the cartridge case. Heat problems, Barrel pressure and its determination, Recoil, facts and measurement, Vibration and jump, Barrel fouling. Exterior Ballistics- Trajectory formation, Vacuum trajectories, Range, Experimental determination and shape of trajectory, Spin, Drift, Angle of fire, Structure of the projectile, Sectional density, Influence of earth and escape velocity, Air resistance, Retardation, Wind deflection, Firing guns in the air, Ricochet. Shotgun Ballistics- Shotguns, Strength of the firearm, Jump and vibration, Recoil, Patterns, Stringing, Wounding power.

Suggested Readings:

1. Criminalistics- An Introduction to Forensic Science By Richard Saferstein.
2. Advanced Practical Physics, Vol.II: Dr. S.P.Singh, Pragati Prakashan, Meerut.
3. Practical Physics: Worsnoff and Flint.
4. Electronic Principles By Albert Malvino and D. J. Bates.
5. Measurement, Instrumentation and Experiment Design in Physics and Engineering By Michael Sayer and Abhaaiman Singh.
6. Instrumental Analysis By Skoog, Holler and Crouch.
7. Nuclear Forensic Analysis By Kenton J. Moody.
8. Nuclear Physics- An Introduction By S. B. Patel.
9. Transducers and Instrumentation By D V S Murty.
10. Laboratory Procedural manual , Physics Section, DFSL, Mumbai.
11. Laboratory Procedural Manual, Forensic Ballistics, DFS, New Delhi.
12. Electronics Communication Systems By Kennedy and Davis.
13. Elements of Civil Engineering By Mimi Das Saikia.
14. Encyclopedia of Forensic Science, Volume one: Jay A Siegel, Pekka J Saukko, Geoffery Knupfer. Academic Press.
15. Forensic Medical Investigation of Motor Vehicle Incidence By Michel P. Burke.
16. Forensic Engineering Fundamentals By Harold Franck.
17. Fire arms in criminal investigation and trials By B R Sharma
18. Handbook of Fire arm and ballistics By Brian J Heard.
19. Fire Arms, Forensic Ballistics, Forensic Chemistry and Criminal Jurisprudence By S N Gaur et al.

Paper-IV (BFC-5T4) Applied Forensic Biology

Max Marks: 50

Unit	Contents
Unit-I	Forensic serology: T cell, B cell structure and function, complement pathway, MHC and self MHC restriction, hypersensitivity reactions. immuno deficiencies; Immuno electrophoretic and Immunodiffusion techniques for determination of human and animal origin from bones, hairs, nails, skin, body tissue, fluids etc., Blood group typing (Blood group typing techniques: Lattes crust assay, Absorption-elution assay) and protein profiling (Methods for profiling: Matrices supporting protein electrophoresis, Separation by molecular weight, separation by isoelectric points). Erythrocyte protein polymorphism, Serum protein polymorphism Biochemistry and genetics of ABO, Rh, MN, systems, blood specific ABH substances, Lectins – their forensic significance, determination of secretor / non secretor Lewis antigen, Bombay Blood group, HLA typing, role serogenetic markers in individualization, paternity disputes etc.
Unit-II	Wild life forensic and forensic ornithology: Introduction and importance of wild life, Protected and endangered species of Animals and Plants. Types of wildlife investigations, Application of forensic science to wildlife investigation, Identification of wild life materials by conventional and modern methods. Identification of Pug marks of various animals census of wild life population. Genetic methodologies in wildlife investigation. Birds flight and means of locomotion, Strikes and collisions, Quarantine issues, Crime Scenes, Confiscated Bird Goods, Anthropological Arte facts, Applications of Forensic Ornithology, Feather structure and topography.
Unit-III	Forensic microbiology: Development of forensic microbiology, Types and identification of microbial organisms/ fungi of forensic significance, mode of action of Anthrax, botulinum and ricin toxin, fungal toxin with special reference to Aflatoxin. Techniques in forensic microbiology. Understanding Bioterrorism: - Types of biological agents – Category A, B, C. Planning and response to bioterrorism –Preparedness Biosurveillance, Biodefense. Epidemiology of Bioterrorism, Punishments for Bioterrorism act Under Prevention of Terrorism Act, 2002. Study of spore, powdered minerals and pollens of forensic importance, Use of pollen grains & spores in criminal or civil investigation.

Suggested Readings:

1. Forensic biology – Richard Li
2. Forensic Medicine – P.V. Guharaj & M. R. Chandran
3. A textbook of Medical jurisprudence and toxicology- Modi
4. Wildlife forensic investigation-Principles and practice: Cooper and Cooper, CRC press
5. Forensic Palynology in the United States of America (1990)- Bryant, V.M. Jr, Mildenhall, D.C. and Jones, J.G.14.PP.193-208
6. Textbook of Pollen Analysis 4th Edition- Faegri, K. Iverson, J. and Krzywinski, K. John Wiley & Sons, New York 1989.
7. Microbial forensics -Roger Breeze, Bruce Budowle, Steven E. Schutzer. Elsevier

Academic Press

8. The Forensic Laboratory Handbook Procedures and Practice - Ashraf Mozayani, Carla Noziglia, 2nd edition. 2011. Human Press.

9. Forensic Science in Wildlife Investigations - Adrian Linacre Taylor and Francis, 2009

10. The Wildlife Detectives: How Forensic Scientists Fight Crimes Against Nature B Donna M.

11. Jackson, Wendy Shattil, Bob Rozinski Universal Athenaeum (Denver, CO, U.S.A.)

12. Forensic palynology Dallas Mildenhall, Patricia Wiltshire, Vaughn Bryant Elsevier, 2006

13. Forensic palynology: an in-depth look at its indispensable value National University, San Diego, 2002

14. Medical microbiology by Ananthnarayan

15. Manual of Clinical microbiology

16. Handbook of toxicology of chemical warfare agents ed by Ramesh Gupta

Paper-V (BFC-5T5) Applied Forensic Psychology

Max Marks: 50

Unit	Contents
Unit-I	Investigative psychology Criminal Psychological Profiling -Nature, Definition. Ethical Guidelines for Criminal profiler. Psychological Investigative Tools- Mental Status Examination, Psychological Testing, Polygraph Testing -Scientific base of Polygraph, Psychophysical Process, Question Formation, Procedure of Polygraph, Analysis of Graph and Limitations. Narco Analysis - Theoretical Viewpoint of Narco analysis, Procedural Requirements, Methodology and Ethical Considerations. Forensic Hypnosis - Theories of Hypnosis, Procedure of Hypnosis, Forensic Hypnosis on Criminals. Brain Electrical Oscillation Signature Profiling - Scientific base of BEOS, Knowing and Remembrance Psychological Autopsy - Manner of Death Defined, Types of Psychological Autopsies. Modus Operandi - Nature, Elements of Modus Operandi, Modus Operandi Risk-Low MO risk and High MO risk.
Unit-II	Causes of Criminal Behavior and Psychological Therapies Major Disorders and it's Symptoms and Features - ADHD, Conduct Disorder, Antisocial Personality Disorder, Sexual Disorder, Substance-Use Disorder-Substance Dependence, Substance Abuse. Psychoanalytic Therapy -Free Association, Resistance, Dream Analysis, Manifest Contents, Latent Contents, Transference, Interpretation, Behaviour Therapy -Systematic Desensitization, Assertive Training, Modeling, Token Economy, Aversive Conditioning. Cognitive Behaviour Therapy - REBT Model, Aron Beck's Cognitive Therapy. Biofeedback .
Unit-III	Rehabilitation & Counselling: Rehabilitation- Models of Rehabilitation - Psychiatric Rehabilitation, Psychological Rehabilitation, Cognitive Rehabilitation and Social

Rehabilitation. Rehabilitation of Prisoners, Rehabilitating victims of crime, Techniques & skills in rehabilitation. Counseling- Definition, Nature of Counseling, Goals of Counselling, Levels of Counselling Techniques- Non-verbal Behavior, Verbal Behavior, Covert Behavior and Interpersonal Manner. Counselling Process- Relationship Establishment, Problem Identification & Exploration, Planning for Problem Solving, Solution Application & Termination. Characteristic of Counsellor, Type of counselling: Crisis, Preventive Skill to counsel criminal
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Suggested Readings:

- 1 'Criminal Profiling-An Introduction to Behavioural Evidence analysis', Brent Turvey, Edition 2nd; 2006, Elsevier Academic press.
- 2 'Handbook of Forensic Psychology', Prof Dr. Vimala Veeraraghwan, Edition 1st, 2009, Selective and Scientific Books Publications, New Delhi.
- 3 'Handbook of Forensic Psychology', Irving B. Weiner, Allen K. Hiss, Edition 3rd, 2006, Wiley Publication.
- 4 'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [03], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
- 5 'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [04], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
- 6 'Abnormal Psychology-The Problem of Maladaptive Behaviour', Irwin G. Sarson, Barbara R. Sarson, Edition 11th, 2012, PHI Publication, New Delhi.
- 7 'Abnormal Psychology', James N. Butcher, Susan M. Mineka, Jill M. Hooley, Edition 15th, 2014, Pearson.
- 8 'Theories Of Counseling and Psychotherapy- Systems, Strategies, and Skills', Linda Seligman, Lourie W. Reichenberg, 2010, third edition, Pearson Education
- 9 'Psychological Interventions of Mental Disorders', S. K. Shrivastava, Nayanika Singh, Shivani Kant, Edition 1st, 2013, Sarup Book Publishers, PVT. LTD.
- 10 'Psychology and Crime', Nageshwar Singh, Edition 1st, 2013, RB SA Publishers, Jaipur.
- 11 'Criminology' [2005] S. M. A. Qadri, fifth edition, EBC Publication, Lucknow
- 12 'Psychological Testing', Anne Anastasi, Susana Urbina, Edition 7th, 2010, PHI Learning PRI. LTD, New Delhi
- 13 'Forensic Psychology-Crime, Justice, Law, Interventions', Graham Davies, Anthony Beech, Edition 2nd, BPS Blackwell Publication.
- 14 'Introduction to counseling & guidance', Robert L. Gibson, Marianne H. Mitchell, Edition 7th, PHI Learning Private Ltd, New Delhi.

Paper-VI (BFC-5T6) Cyber Security

Max Marks: 50

Unit	Contents
Unit-I	Introduction to Cyber Security: Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.
Unit-II	Foundations of Network Security: Principles of Network Security, Network Security Terminologies, Network Security and Data Availability, Components of Network Security , Network Security Policies , Advanced TCP/IP: TCP/IP Concepts, Subnet Masks, Variable Length Subnet Masks, Unicast, Broadcast and Multiple Concepts, The Three way Handshake, The Process of DHCP and APIPA, Internet Protocol version 6.
Unit-III	Intrusion Detection and Prevention: Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

Suggested Readings:

1. M. Merkow, j. Breithaupt, information security principles and practices, Pearson education 2005
2. G.R.F. Snyder, T.Pardoe, Network Security, Cengage learning, 2010
3. Anderson, Ross, Security Engineering, John Wiley & sons, 2008
4. Handbook of Applied Cryptography” by Alfred J Menezes and Scott A Vanstone
5. “Cryptography and Network Security: Principles and Practice” by William Stallings
6. Threat Modelling, Designing for Security, Adam Shostack, 2014
7. The practice of Network Security Monitoring, Richard Bejtlich, 2013
8. Practical Malware Analysis, Michael Siroski, 2012
9. Practical reverse engineering, Bruce Dang, 2014

SEMESTER-VI

Paper-I (BFC-6T1) Applied Forensic Science

Max Marks: 50

Unit	Contents
Unit-I	Forensic Speaker Identification: Introduction and scope of forensic speaker identification, speaker identification vs. speaker verification. Human vocal tract, production and description of speech sound, acoustic characteristics of speech signal, introduction to phonetics and its importance in forensic speaker identification, International Phonetics Alphabets (IPA) and its symbolic representation. Methods of speaker identification open and close set, sound spectrograph and its analysis, analysis of vowel and consonant sound. Voice evidence: collection of voice sample, examination and formation of opinion in terms of probability scale, presenting evidence in court of law in view of forensic speaker identification. Recent advancements-Automated speaker identification: text dependent and text independent approach.
Unit-II	Forensic Medicine-II: Medical Autopsy: Introduction and objectives, rules for medico legal autopsy, external and internal examination of body, examination of clothing and weapons, collection of postmortem samples, autopsy report. Injury: Introduction and classification of injury; medico legal aspects of injuries; mechanical injuries-Abrasions, Bruises, Lacerations, Incised wounds, stab wounds, defense wound and self-inflicted wounds; Regional injuries- Head injury, injuries to brain, abdomen and other body parts; accident injuries: vehicular injuries, railway injuries and aircraft injuries; injury due to fall. Thermal injuries: Burn and scalds, Lightning, Electricity and Explosions. Infanticide: Introduction, definition and types. Forensic Psychiatry: Introduction and medico legal aspects.
Unit-III	Emerging trends in Forensic Science: Introduction, scope and importance of emerging forensic disciplines: Forensic Engineering, Forensic Radiology, Forensic Accounting, Forensic Nursing, Forensic Nanotechnology, Forensic Archaeology, Forensic Arts, Computational Forensics, Nuclear Forensics, Forensic Journalism, Environmental Forensics, Forensic Pharmacology, and Forensic Biotechnology.

Suggested Readings:

1. Voice Identification: Theory and Legal Applications, Oscar Tosi, University Park Press, Baltimore, USA, 1979.
2. A Course in Phonetics, Sixth Edition, Peter Ladefoged and Keith Johnson, Wardsworth Cengage Learning, Boston, USA, 2011.
3. Forensic Speaker Identification, Philip Rose, CRC Press, USA, 2003.
4. Speech Acoustics and Phonetics, Gunar Fant, Springer Publishers, USA, 2004.

5. Speech Science Primer: Physiology, Acoustics, and Perception of Speech, Lawrence J. Raphael, Gloria J. Borden, Katherine S. Harris, Lippincott Williams & Wilkins, 2007.
6. Fundamentals of Speech Science, Donald J. Fucci and Norman J. Lass, Allyn and Bacon, 1997.
7. A Guide to Forensic Accounting Investigation, Steven L. Skalak, Thomas W. Golden, Mona M. Clayton, Jessica S. Pi, John Wiley Publishers.
8. Forensic Accounting and Fraud Examination, Jo Kranacher, Richard Riley, Joseph T. Wells, John Wiley Publishers, 2011
9. Brogdon's Forensic Radiology, Michael J. Thali, M.D., Mark D. Viner, B.G. Brogdon, Taylor & Francis, 2010
10. Fundamentals of Forensic Science, Max M. Houck, Jay A. Siegel, Academic Press Publishers, 2010.
11. Forensic Archaeology: Advances in Theory and Practice, John Hunter, Margaret Cox, Taylor and Francis, 2005.
12. Forensic Engineering-Kenneth L. Carper, Taylor and Francis Publishers
13. Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology: C. K. Parikh, CBS Publishers & Distributors Pvt. Ltd., India, 1999
14. Forensic Medicine: Guharaj, P. V., Chandran M. R, 2nd Ed., Universities Press (India) Pvt. Ltd., Hyderabad, 2006
15. Forensic Nursing Science, 2nd Edition, Virginia A. Lynch and Janet Barber Duval, Elsevier, 2011.
16. Forensic Pharmacology, Beth E. Zedeck and Morris S. Zedeck, Chelsea House Publishers, 2007.
17. Forensic Science and Nanotechnology: Applying Nanoparticles for Visualizing Latent Fingerprints, Matias Sametband, Hebrew University of Jerusalem Publishers, 2007.
18. Textbook of Forensic Medicine and Toxicology, Nageshkumar G Rao, Jaypee Publishers, 1999.
19. Textbook of Forensic Medicine and Toxicology, Anil Aggrawal, Avichal Publishing Company, 2014.

Paper-II (BFC-6T2) Applied Forensic Chemistry

Max Marks: 50

Unit	Contents
Unit-I	Narcotic Drug and Psychotropic Substances Analysis of Narcotic Drugs and Psychotropic Substances, Drug effects, drug Hazards, Tolerance and dependence of drugs, Problems of drug addiction, Identification of drug addict, Drug addicts and crimes, Classification of Narcotics and other drugs, Analytical techniques for identification of drugs. Types of Pharma drugs, Steroids, Forensic Pharmacological studies, Ingestion of drugs, absorption, distribution, metabolism, pathways of drug metabolism, drug metabolism and drug toxicity, excretion of drugs. Characterization and synthesis of nicotine, cocaine and their derivatives.
Unit-II	Explosive Introduction, Classification of explosive, types of chemical explosive,

	Combustion, Deflagration and Detonation, Ignition, Initiation and Thermal Decomposition, preparation of picric acid, Trinitrotoluene, TATB (1,3,5-Triamino-2,4,6-trinitrobenzene), HNS (Hexanitrostilbene). Dyes:- introduction classification, colour and structure, theories of dyes, synthesis of dyes, azo dyes, triphenylmethane dyes, phthalein dyes, indigotin dyes, application. Anthracene - structure determination, resonance, isolation, physical, chemical properties and uses. synthesis, physical, chemical properties and uses of Anthraquinone and Alizarine.
Unit-III	General Forensic Chemistry Arson: chemistry of fire, fire extinguisher, investigation and evaluation of clue material, analysis of arson exhibits by instrumental methods: Management of Arson cases, Food adulteration: Introduction, Prevention of food adulteration, Analytical techniques for analysis of exhibits involved in food and other material cases. Sampling of food, Determination of moisture, ash, titrable acidity, pH and Sodium chloride, <i>Butterwater</i>, salt, curd, lactose, fat, ash. Pesticides: Introduction, Classification, synthesis of DDT, Malathion, BHC, Parathion, applications. Relevant provision of:- Prevention of Food Adulteration Act 1954 (Definition, Power of Food Inspector, Offences and Penalties), Narcotic Drugs & Psychotropic Substances Act 1985 (Definition, Licit Opium Cultivation, Minimum and Commercial Quantity in Narcotic Drugs, Offences and Penalties), Prevention of Illicit Trafficking in NDPS Act 1985 (Detention of a Person Under the Act), Drugs Control Act 1940 (Definition, Power of Chief Commissioner Under the Act), Drugs & Cosmetics Act 1945 (Definition, Adulterated, Misbranded, Spurious Drugs and Cosmetics, Offenses and Penalties), Arson cases.

Suggested Readings:

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
2. S. N. Tiwari, Analytical Toxicology, Govt. of India publications, New Delhi 1987
3. Brown P. R., Advance in Chromatography.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Bahl and Bahl, Organic chemistry.
6. Bahl and Bahl, Physical chemistry.
7. Mehta and Mehta Organic chemistry.
8. S.V.Bhat Natural Product. John Kenkel, Analytical Chemistry for Technicians.
9. Feigl, Spot Test in Organic chemistry.
10. Feigl, Spot Test in Inorganic chemistry.
11. Vogel's Qualitative Inorganic Analysis.
12. D.C. Garratt, The Quantitative Analysis of Drugs.
13. Howard: Forensics Analysis by Gas Chromatography.
14. Yinon: Forensic Application of Mass Spectroscopy 1994.
15. Prakash M. et.al; Methods in Toxicology Anmol Publication, New Delhi (1998)

16. Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi (1999)
17. Balraj S. Parmar et.al; Pesticide Formulation, CBS Publishers, New Delhi (2004)
18. Casarett & Doll Toxicology, The basic Science of Poisons
19. Curry A. S., Poison Detection in Human Organs 1976
20. Curry : Analytical Method in Human Toxicology 1986.
21. Lee and Gaensslem.: Advances in Forensic Science (Vol. 2) Instrumental Analysis.
22. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
23. Serope Kalpakjian, Steven R Schmid. "Manufacturing Engineering and Technology" International edition. 4th Ed. Prentice Hall, Inc. 2001.
25. Hans-J. Koslowski. "Dictionary of Man-made fibers". Second edition. Deutscher Fachverlag.2009.
26. Borrow: Molecular Spectroscopy 1980.
27. Willard H. H. et. al : Instrumental Methods of Analysis 1974.
28. Moonesens A. A. et. al. : Scientific Evidence in Criminal Cases 1973.
29. Lundquist and Curry: Methods of Forensic Sciences 1963.
30. Holfmann, F. G., Hand book of drug and alcohol abuse.
31. Arena Poisoning, Chemistry Symptoms and treatment,
32. Analysis of Plant Poisons, Dr. M P Goutam.
33. Drug Abuse Handbook, Karch.s.
34. Constitution of India
35. Indian Evidence Act.
36. Criminal Procedure code
37. Indian Penal Code.
38. Bare Acts with short notes on the following : Narcotic Drugs & Psychotropic Substances Act,
39. Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act
40. Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act,
41. Wild Life Protection Act

Paper-III (BFC-6T3) Applied Forensic Physics

Max Marks: 50

Unit	Contents
Unit-I	Footwear Impressions- Casting 3-D Footwear Impressions: Introduction to casting, Importance of casting, Benefits of casts over photographs, Casting materials, Methods of casting with dental stone, Casting footwear impressions in snow. Treatment of 2-D Footwear Impressions: Lifting 2-D footwear impressions, Lifting impressions electro statically and electrostatic lifting devices, Gelatin and adhesive lifting, Other lifting materials and choices, Powdering impressions, Deformable impressions, Impressions on carpets, cushions, grass and skin.

	Enhancement of Footwear Impressions: Specialized lighting and Photographic
Unit-II	Forensic Microscopy- Basics of microscope, common terms used in microscopy, Construction, working, applications and limitations of -Compound microscope, Comparison microscope, Stereomicroscope, Polarizing microscope, Micro spectrophotometer, Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM). Introduction to: Environmental Scanning Electron Microscope (ESEM), Auger Electron Spectroscopy (AES), X- Ray Photoelectron Spectroscopy (XPS) , Secondary Ion Mass Spectrometer (SIMS), X- Ray Fluorescence. (XRF), Atomic Force and Tunneling Scanning Microscope (AF & TS), Phase contrast Microscope and Digital Microscope.
Unit-III	Forensic Applications in Trace Analysis- Physical properties of materials: temperature, weight and mass, density, refractive index and their forensic importance. Glass: Composition of glass, Comparison of glass fragments, Measuring and comparing density and refractive index of glass, classification of glass samples, Glass fractures, Collection and preservation of glass evidence. Soil: Significance of soil evidence, Variations in soil, Collection and preservation of soil evidence, Forensic examination of soil. Fibre: Types, Identification and comparison of manufactured fibres (Microscopic examination, Dye composition, Chemical composition, Other properties for examination), Significance of match, Collection and preservation of fibre evidence. Forensic examination of cloth and cloth fibres. Paint: Composition of paint, Classification of common paints, Pigment Volume concentration number, Microscopic examination of paint, Analytical tools used in paint comparison, significance of paint evidence, collection and preservation of paint evidence. Forensic examination of paint. Plastic: Classification of plastics according to thermal and mechanical property, Plastics in common use.

Suggested Readings:

1. Footwear Impressions Evidence Detection, Recovery, and Examination Second Edition by William J. Bodziak CRC Press.
2. Criminalistics- An Introduction to Forensic Science By Richard Saferstein.
3. Measurement, Instrumentation and Experiment Design in Physics and Engineering By Michael Sayer and Abhaaiman Singh.
4. Laboratory Procedural manual , Physics Section, DFSL, Mumbai.
5. Laboratory Procedural Manual, Forensic Ballistics, DFS, New Delhi.
6. Building Materials By P. C. Varghese.
7. Trace Evidence By Max M. Houck.

Paper-IV (BFC-6T4) Applied Forensic Biology

Max Marks: 50

Unit	Contents
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Unit-I	DNA profiling and its forensic significance History of DNA fingerprinting, Human genetics – Heredity, Alleles, Mutations & Population genetic, Molecular biology of DNA. Forensic Application of recombinant DNA technology/ Forensic Biotechnology, Human genome project, Variations, Polymorphism in DNA system – DNA markers RELP, RAPD, VNTRs, SNP, Autosomal – STR, Y-STR, Mitochondrial DNA. Forensic significance of DNA profiling:- Application in disputed paternity cases, child swapping, Missing person's Identity – immigration, veterinary & wild life and Agriculture cases, legal perspectives – legal standards for admissibility of DNA profiling, procedural and ethical concerns, status of development of DNA profiling in India and abroad. New and future technologies: DNA chips, SNPs and limitations of DNA profiling
Unit-II	Clinical Biochemistry and Genetic Analysis: Fluid electrolyte homeostasis in the body: Role of water, electrolytes in the body, hydrogen ion concentration and buffer, regulation of blood, pH, disorder of Acid-base balance acidosis and alkosis Disorders of Metabolism: 1. Carbohydrate metabolism: Diabetes mellitus, glycogen storage disease 2. Lipids: Hypercholesterolemia 3. Blood: Thalassemia, sickle cell anemia 4. Amino acids: phenylketonuria, alkaptonuria, tyrosemia 5. Purine and pyrimidine: Lesch-Nyan syndrome, Gout diseases, SCID Renal function test, liver function test, pancreatic function test, Gastric function test, thyroid function test, detoxification.
Unit-III	Forensic Entomology Introduction & History, Identification of insects, Training required, Determination of Time elapsed since death, Dipterans Larval Development, Succession colonization during the process of decomposition of body, Determination of displacement and disturbance of the body, Presence and Position of wounds, Drugs consumption, Human & Animal neglect or abuse, Collection of entomological evidence, Challenges encountered in Entomology, Report Submission, Testifying in Court.

Suggested Readings:

1. Forensic Science in criminal investigation and trials – B.R. Sharma
2. Forensic Science in Crime Investigation – Dr. Mrs. Rukmani Krishnamurthy
3. Forensic Science – An introduction to scientific and investigative techniques – Stuart H. James & Jon J. Nordby
4. Forensic Medicine – P.V. Guharaj & M. R. Chandran
5. Blood, bugs and plants- R.E Gaensslen
6. Wildlife forensic investigation-Principles and practice: Cooper and Cooper, CRC press
7. Forensic Palynology in the United States of America (1990)- Bryant, V.M. Jr, Mildenhall, D.C. and Jones, J.G.14.PP.193-208

8. Textbook of Pollen Analysis 4th Edition- Faegri, K. Iverson, J. and Krzywinski, K. John Wiley & Sons, New York 1989.
9. Microbial forensics -Roger Breeze, Bruce Budowle, Steven E. Schutzer.Elsevier Academic Press
10. The Forensic Laboratory Handbook Procedures and Practice - Ashraf Mozayani, Carla Noziglia. 2nd edition. 2011. Human Press.
11. Forensic Science in Wildlife Investigations - Adrian Linacre Taylor and Francis, 2009
12. Text book of biochemistry and human biology- G.P Talwar, L,M Srivastava
13. Practical skills in biomolecular science- Rob Reed, David Holmes
14. Experimental biology: A laboratory manual – Abhijeet Dutta
15. The Wildlife Detectives: How Forensic Scientists Fight Crimes Against Nature B Donna M.
16. Jackson, Wendy Shattil, Bob Rozinski Universal Athenaeum (Denver, CO, U.S.A.)
17. Forensic Entomology: The Utility of Arthropods in Legal Investigations Jason H.Byrd, James L. Castner Taylor and Francis, 2009
18. Forensic entomology: an introduction By Dorothy E. Gennard Wiley.
19. Forensic palynology Dallas Mildenhall, Patricia Wiltshire, Vaughn Bryant Elsevier, 2006
20. Forensic palynology: an in-depth look at its indispensable value National University, SanDiego, 2002

Paper-V (BFC-6T5) Advanced Forensic Psychology

Max Marks: 50

Unit	Contents
Unit-I	Stress and Police Psychology Stress- Definition, Nature, Models of stress- Response based model, Stimulus based model, Transactional/Interactive model. The Stress Response: A Psychophysiological Perspective- The Autonomic Nervous System, Endocrine System, Cardiovascular System, Immune System and Muscular-Skeletal System Consequences of Stress- Physiological, Psychological, Behavioural. Stress and Burnout, Coping with the stress, Stress Management. Police psychology- Nature, Psychological testing & selection of police officer: aptitude test, intelligence test, personality test. Stress and Policing, Types of police stress, Fitness for duty evaluation, Police suicide
Unit-II	Crime and Delinquency Psychology of crime & Delinquency, Juvenile Delinquency: Definition, Concept. The Developmental perspectives in delinquent behaviour- Developmental theory, Coercion Developmental Model. Risk Factors of Juvenile Delinquency- Biological Factors – Temperament, Genetic influence, Hormones and aggression, Substance abuse. Individual- intelligence, language development, Selfregulation skills & Exeutive functions. Family- Family pattern, Rejection in family, Family Conflicts, Family Relationships,

	Emotional Deprivation. Social factors- Peer Group, Cultural Values, Media. Juvenile Psychopathy, Prevention and Control of Juvenile Delinquency
Unit-III	Psychology & court Mc Naughten rule, Insanity – Nature of Insanity, Insanity Assessment, Personality Assessment of Offender. Competency to stand trial, Risk Assessment, Sentencing Evaluation, The mentally ill in Court. Legal aspect- Mental Health Act, 1987 [Reception Order, Object, Establishment or Maintenance of Psychiatric Hospitals and Psychiatric Nursing Homes, Procedures on Production of Mentally Ill Person in front of Magistrate], Medical Termination of Pregnancy Act., Pre Natal Diagnostic Technique Act.

Suggested Readings:

- 1 'Forensic and Criminal Psychology', Dennis Howitt, 2002 Pearson Education LTD, England.
- 2 'Introduction to Forensic Psychology-Court, Law Enforcement and Correctional Practices', Stacy L. Shipley, Bruce A. Arrigo, Edition 3rd, 2012, Elsevier Academic press.
- 3 'Stress Management', Ruth Baer, Edition 1st 2010, Global Vision Publication House, New Delhi.
- 4 'Handbook of Stress, Coping and Health', Virginia Hill Rice, Edition 1st, 2000, Sage Publications, Inc.
- 5 'Mental Health-Risk and Resources', Deepti Hooda, NovRattan Sharma, Edition 1st, 2013, Global Vision Publishing House, New Delhi
- 6 'Juvenile and Crime In Indian', Dr. Rajesh S. Vyas, Dr. Ashok M. Shroff, Edition 1st, 2013, Shri Niwas Publications, Jaipur.
- 7 Parental development-Social & Emotional development- 'A Textbook of Child Psychology', D. N. Prabhakar, Editon 1st, 2014, Astha Publication, New Delhi.
- 8 'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [01], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
- 9 'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [02], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
- 10 'Forensic Psychology-Crime, Justice, Law, Interventions', Graham Davies, Anthony Beech, Edition 2nd, BPS Blackwell Publication.
- 11 'Forensic Psychology and Neuropsychology for Criminal and Civil Cases', Harold V. Hall, Edition 1st, 2008, CRC Press
- 12 'Criminology' [2005] S. M. A. Qadri, fifth edition, EBC Publication, Lucknow
- 'Stress Management', Walt Schafer, Edition 4th Cengage Learning India Private Ltd., New Delhi.

Paper-VI (BFC-6T6) Cyber Security

Max Marks: 50

Unit	Contents
Unit-I	IP Packet Structure and Analysis: Capture and Identify IP Datagrams, Capture and Identify ICMP Messages , Capture and Identify TCP Headers

	, Capture and Identify UDP Headers, Packet Fragmentation , The Three way Handshake. Routing and Access Control Lists: Arp Process , Cisco Routing Modes , Routing Process, Routing Tables , Access Control Lists , Implement Access Control Lists, Limitations, DNS and Its Role.
Unit-II	Securing Windows : Windows NT 4.0 Fundamental Security , Windows NT Resource Security , Windows 2000 Authentication , Windows 2000 User and Group Security, Windows 2000 Resource Security, Windows 2000 Network Security. Securing Linux: Key Concepts, Linux Administration and Security, Key Linux Network Files , Key Linux Network Process, Key Linux Network Commands, Hardening Linux, Network File System and Linux , Network Information Service and Linux
Unit-III	Security on the Internet and World Wide Web: Components of Internet, Weak Points of Internet, Techniques of Web Hacking, Methods of Attacking Users, Attack Techniques: Network Reconnaissance , Mapping and sweeping the Network , Scanning the Network, Viruses, Worms and Trojan Horses , Gaining Control on Systems , Record Keystrokes, Crack Encrypted Passwords , Reveal Hidden Passwords, Case Study – Social Engineering , Gain Unauthorized Access , Hide evidence of Attack , Perform a Denial of Service attack .

Suggested Readings:

1. Practical Packet Analysis, Wireshark
2. Protect your Windows Network
3. Internetworking Technologies Handbook
4. Windows 2000 Commands Pocket Reference
Writing Information Security policy
5. Security Warrior

PRACTICAL PAPERS (SEMESTER V AND VI)

***Practical examination for Semester V and Semester VI will be conducted annually for 50 marks. However, practical has to be conducted from the given list. In each semester, at least six (06) practical must be performed and certified by the Instructor.

Practical Paper I - (BFC-6P1)

(Practical based on Theory papers BFS-5T1 and BFS-6T1)

Applied Forensic Science

Max Marks: - 50

Sr. No	Semester: -V List of experiments based on theory paper BFC-5T1
1.	To identify types of human bones.
2.	To determine origin of skeletal remains (human/animal).
3.	To determine number of individuals from skeletal remains.
4.	To estimate stature from long bones.
5.	To determine sex from skull and pelvis.
6.	To determine age from skull and teeth.
7.	To study the features of Bite marks.
8.	To calibrate glassware and instruments.
9.	To evaluate the quality of given sample in reference to quality assurance.
10.	To re-evaluate (proficiency testing) a sample as per NABL guidelines.
11.	To estimate uncertainty in measurement.

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T1
1.	To record speech sample of a subject.
2.	To represent speech signal in the form of waveform and to resample the same.
3.	To convert analog speech signal into digital one.
4.	To segregate voice sample of a particular subject.
5.	To form clue words of given speech sample of a subject.
6.	To describe speech sample in terms of IPA.
7.	To perform auditory analysis on a given set of speakers.
8.	To study formant frequency in a given sound spectrograph.
9.	To study pitch and intonation pattern in a given sound spectrograph.
10.	To study LPC in a given sound spectrograph.
11.	To perform pre-mortem analysis of a cadaver.
12.	To study post-mortem findings of a cadaver

Practical Paper II - (BFC-6P2)

(Practical based on Theory papers BFS-5T2 and BFS-6T2)

Applied Forensic Chemistry

Max Marks: - 50

Sr. No	Semester: -V List of experiments based on theory paper BFC-5T2
1.	Identification of food adulteration.-vegetable oil, Cold drinks etc.
2.	Quantitative or qualitative study of drug opiates.

3.	Examination of fire arson cases by GC, TLC.
4.	Detection and determination of various adulterants in alcohol, by colour tests.(Qualitative analysis)
5.	Chemical analysis of explosive materials.(Gun powder)- Colour test, Microscopic examination
6.	Analysis of alcohol from blood (quantitative by GC).

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T2
1.	Extraction methods of drugs, Poisons.
2.	Colour Tests for identification of poisons, drugs.
3.	Plant, animal, Metallic poison analysis.
4.	Polymer Testing.
5.	Separation of Sampling Material by TLC (drugs, poison etc.)
6.	Study of Steroids (separation by TLC).
7.	Examination of chemicals used in Trap cases by UV-visible spectroscopy
8.	Examination of other metal.
9.	Estimation of CaO in the given sample of Portland cement by gravimetric method.

Practical Paper III - (BFC-6P3)

(Practical based on Theory papers BFS-5T3 and BFS-6T3)

Applied Forensic Physics

Max Marks: - 50

Sr. No	Semester: -V List of experiments based on theory paper BFC-5T3
1.	Photographic technique by using SLR/ Digital camera.
2.	Analysis of accident / crime scene photography
3.	Development of 35 mm photograph.
4.	Magnetic susceptibility measurement by Quinck's / Gouy's method.
5.	Hall effect and Hall measurements.
6.	Resistivity measurement by Four Probe / Van der Pauw method.
7.	Examination and Identification of electrical wires / cables.
8.	Forensic examination of tampered electric energy meters.
9.	FET and study of its characteristics.
10.	Study of optical fiber communication system.
11.	Working with Geiger Mueller counter.
12.	Analysis of XRD pattern.
13.	Study of road design and road measurements.
14.	Examination of tire/ other marks
15.	Physical examination accidental vehicle.
16.	Peripheral vision measurement.
17.	Study of effect of a pressure on metal disc and its co-relation with barrel pressure.
18.	Trajectory simulation (sample calculations).

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T3
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1.	Photography of 3-D /2- D shoe/bare foot prints.
2.	Casting of 3-D Shoeprint using plaster of Paris/dental stone in mud or clay.
3.	Casting of 3-D print in snow using sulphur and other methods.
4.	Identification of foot prints by crime lights and lifting by gelatin and adhesive lifting.
5.	Enhancement of shoe/bear print by specialized lighting source along with photography.
6.	Development of latent shoe /bear foot print using physical developer (powder method)
7.	Development and lifting of 2-D print by electrostatic methods.
8.	Dismantling and assembling of compound microscope.
9.	Study of forensic sample under stereomicroscope along with photography.
10.	Examination of coins/metal pieces/wires/tools/bullets/palettes/ cartridges/ under ballistic comparison microscope along with photography.
11.	Examination of fibers under biological microscope along with photography.
12.	Examination of soil sample using soil testing kit.
13.	Comparison of soil/glass using density gradient column method.
14.	Study of glass fractures due to impacts / heat.
15.	Study the refractive index of glass samples
16.	Determination of density of solid material by volume displacement method.
17.	To perform Thermal Decomposition test (TDT) test on soil sample
18.	Microscopic examination of paint sample.
19.	Examination of plastic evidences under comparison microscope.
20.	Stress / Breaking point determination.
21.	Fiber strength measurements.

Practical Paper IV - (BFC-6P4)

(Practical based on Theory papers BFS-5T4 and BFS-6T4)

Applied Forensic Biology

Max Marks: - 50

Sr. No	Semester: -V List of experiments based on theory paper BFC-5T4
1.	To perform precipitin test for species of origin determination
2.	To perform Immunodiffusion test for species of origin
3.	Blood grouping from stains of blood, semen, saliva and other body fluids by Absorption inhibition,
4.	Absorption-elution for determination of Secretor non secretor status.
5.	Identification of orders of insects and other arthropods of forensic Significance.
6.	Study of pugmarks of animals
7.	Preparation of permanent slides by using maceration technique of various forensic material of Plant origin
8.	Isolation of endospore forming bacteria
9.	To examine Barr bodies from blood sample.
10.	To identify blood, semen and saliva stains.
11.	To determine species of origin from blood
12.	Identification and culture of bacteria of forensic significance.
13.	Isolation of <i>Aspergillus flavus</i> and identification of its toxin by fluorescence
14.	Identification of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants

15.	Identification of birds from feathers.
16.	Study of pollen grains and spores of forensic significance.
17.	Examination of fur, nails, horn, teeth

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T4
1.	Organic extraction of DNA from liquid blood samples
2.	Organic extraction of DNA from sperm cell
3.	Identification of bacteria using Restriction fragment length polymorphism
4.	Determination of glucose in blood by Glucose oxidation test
5.	Serum glutamate pyruvate transaminase (SGPT test)
6.	Laboratory rearing of forensic insects
7.	Study of aquatic insects in forensic investigation
8.	Effect of toxin on lifecycle of blow flies
9.	Amplification of DNA by Polymerase chain reaction (PCR)
10.	DNA quantification by Gel electrophoresis
11.	Karyotyping for genetic diseases
12.	Microscopic study of Sickle cell anemia and Thalassemia blood samples
13.	Effect of displacement of body on life cycle of blow flies
14.	Study of microscopic and physiologic characteristics (Size, shape, pH, etc.) of normal and abnormal blood

Practical Paper V - (BFC-5P5)

(Practical based on Theory papers BFS-5T5 and BFS-6T5)

Applied Forensic Psychology

Max Marks: - 50

Sr. No	Semester: -V List of experiments based on theory paper BFC-5T5
1	Forming Relevant Questions with Polygraph
2	Forming irrelevant Questions with Polygraph
3	Forming Control Questions with Polygraph
4	Perceived Loneliness Scale.
5	Rosenswieg Picture Frustration (adult)
6	Neuroticism Scale Questionnaire (NSQ)- Ivan H. Scheier & R.B. Cattell
7	Eight state questioner (8SQ)- M. Kapoor, M. Bhargava
8	Mental Depression Scale
9	Dimensional Personality Inventory
10	Maudsley Personality Inventory (MPI)- H.J. Eysenk

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T5
1	Self Concept Questionnaire – Dr. Rajkumar Saraswat.
2	Bender-Gestalt Test
3	Social Motive Test
4	Social Distance Scale
5	16PF – R.B. Cattell
6	Weschler Adult Intelligence Test

7	Differential Aptitude Test
8	Self-Expression Inventory
9	State trait anxiety anger expression inventory- Charles D., Spielberger
10	State trait anxiety inventory (adult)- Charles D., Spielbergers

Practical Paper VI - (BFC-6P6)
(Practical based on Theory papers **BFS-5T6** and **BFS-6T6**)
Cyber Security

Max Marks: - 50

Sr. No	Semester: -V List of experiments based on theory paper BFC-5T6
1.	Perform different types of cryptographic attacks
2.	Perform an experiment for port scanning with nmap, superscan or any other software
3.	Using nmap 1)find open ports on a system 2) find the machines which are active 3)find the version of remote os on other systems 4)find the version of s/w installed on other system
4.	Perform network scanning to identify live and vulnerable machines in a network
5.	Perform packet sniffing
6.	Perform system hacking
7.	Perform steganography, stegnagrophy attacks
8.	Identify viruses, worms, malware that exploit computer system
9.	Perform vulnerability analysis to identify security loopholes in the target's organization Network, communication infrastructure and end system
10	Access Norton Website's tools to scan the system for security problems
11	Drive and partition carving process
12	Advance firewall auditing
13	Auditing with and without network traffic
14	Auditing Authentication, Authorization, accounting and logging configuration
15	Intrusion detection and prevention configuration

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T6
1.	Demonstrate ERD commander and Samspade an information gathering tool
2.	Password encryption techniques
3.	Collect the information by using NS look up
4.	Cracking password using aircrack tool
5.	Crack the password by using Rainbow crack tool

6.	Listing and viewing Files and directories in Linux
7.	Searching files in Linux
8.	Using command tar, gzip,ftp in Linux
9.	Detail Analysis of E-mail ,E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery
10	Footprinting using footprinting tools(Open Source & Free)(ex-nslookup, ARIN, Whois, Google Earth etc.) .
11	Scanning for vulnerabilities using (Angry IP, HPing2, IPScanner, Global Network Inventory Scanner, Net Tools Suite Pack.)
12	NetBIOS Enumeration Using NetView Tool, Nbtstat Enumeration Tool (Open Source).
13	Detection of Trojans by using – Netstat, fPort, TCPView, CurrPorts Tool, Process Viewer.
14	Lan Scanner using look@LAN, wireshark. 28. Understanding DoS Attack Tools- Jolt2, Bubonic, Land and LaTierra, Targa, Nemesis Blast, Panther2, Crazy Pinger, Sometrouble, UDP Flood, FSMax

*****End of the syllabus*****

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