

S-08th July, 2014 AC after Circulars from Circular No.84 & onwards

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S-[F] NPW-02 June-2014-2015 All Syllabus Science Faculty B. Sc. II Yr. Forensic
Science [Sem.III & IV] - 1 -

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



Syllabus

of

B.Sc. (Forensic Science), Second Year

SEMESTER SYSTEM

THIRD / FOURTH SEMESTER

Effective from Academic Year

20014-2015 onwards

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J. S. S.

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B.Sc. (Forensic Science) Second Year
Semester III and IV
General curriculum pattern of the course

Paper	Title of Paper	Marks				Work load Hours/Week	
		Semester		Practical (Sem III+IV) (Annually)	Total	Theory	Practical/ batch
		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.Digital and 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 Marks		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.*

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Curriculum structure and marking scheme for Theory and Practical papers

Curriculum structure and marking scheme for Theory papers			
Semester – III			
Course code	Paper No.	Title of Paper	Marks
BFS-3T1	I	Advanced Forensic Science	50
BFS-3T2	II	Advanced Forensic Chemistry	50
BFS-3T3	III	Advanced Forensic Physics	50
BFS-3T4	IV	Advanced Forensic Biology	50
BFS-3T5	V	Advanced Forensic Psychology	50
BFS-3T6	VI	Advanced Digital and Cyber Forensics	50
BFS-3T7	VII	Criminal Procedure Code	50
BFS-3T8	VIII	Law of evidence	50
		Total	400
Semester – IV			
Course code	Paper No.	Title of Paper	Marks
BFS-4T1	I	Advanced Forensic Science	50
BFS-4T2	II	Advanced Forensic Chemistry	50
BFS-4T3	III	Advanced Forensic Physics	50
BFS-4T4	IV	Advanced Forensic Biology	50
BFS-4T5	V	Advanced Forensic Psychology	50
BFS-4T6	VI	Advanced Digital and Cyber Forensics	50
BFS-4T7	VII	Criminal Procedure Code	50
BFS-4T8	VIII	Law of evidence	50
		Total	400

Curriculum structure and marking scheme for practical papers			
Semester – III and IV (Annual Examination)			
Course code	Paper No.	Title of Paper	Marks
BFS-4P1	I	Practical based on papers BFS-3T1 and BFS-4T1	50
BFS-4P2	II	Practical based on papers BFS-3T2 and BFS-4T2	50
BFS-4P3	III	Practical based on papers BFS-3T3 and BFS-4T3	50
BFS-4P4	IV	Practical based on papers BFS-3T4 and BFS-4T4	50
BFS-4P5	V	Practical based on papers BFS-3T5 and BFS-4T5	50
BFS-4P6	VI	Practical based on papers BFS-3T6 and BFS-4T6	50
		TOTAL	300

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Examination pattern for theory and practical:

The course of study for the B.Sc. Forensic Science examination is divided in six semesters. Semester III and IV will have eight theory 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 semester (Annual). Each practical paper will carry 50 marks. ***Paper VII and VIII are only theory based papers and there will not be any practical examination for the same in both semester i.e. III and IV.**

Theory examination will be of 2 hours duration and practical examination will be of 3 hours duration.

Structure of class and practical

Maximum number of students in a class for theory and for Practical Batch shall be as per prevailing rules of Dr. BAMU, Aurangabad for general B. Sc.

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 semesters (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 division.
- (d) A candidate who secures an aggregate of 70% and above marks on the whole shall be declared to have passed the examinations with first class 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 shall be permitted to clear those papers before or along third year examination.

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SEMESTER III**Paper I
Advanced Forensic Science
Semester: -III (BFS3T1)****Max Marks: 50**

Unit	Contents	No. of lectures
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.	15
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.	15
Unit III	Fingerprint: Definition, History and development, Dermatoglyphics, Theory, Principles, Significance (Physical,	15

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	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 (buckle), 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:

Sr. 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, 2 nd 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 Surinder Nath.
25.	Forensic science and its related issues by V N Sehgal and Surinder Nath.

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Paper II
Advanced Forensic Chemistry
Semester: -III (BFS3T2)

Max Marks: - 50

Unit	Contents	No. of Lectures
Unit I	<p>Physical Chemistry: Chemical thermodynamics- Gibbs- Helmholtz's energy efficiency, entropy, work function.</p> <p>Chemical kinetics – Energy of activation, molecular activation-collision theory, Specific reaction rate-half-life expression.</p> <p>Electro chemistry: Laws of electrochemistry, Electro chemical cell, salt bridge, EMF-set up of cell –examples Daniel cell</p> <p>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</p>	15
Unit II	<p>Inorganic and separation techniques: Metal and Non Metals- Preparation, occurrence, properties, uses.</p> <p>Hard and soft acids and bases – definition, classifications, Principles and applications, limitation.</p> <p>Separation techniques: Introduction, types of separation,</p> <p>Paper chromatography- introduction, principle, migration parameters, types of paper chromatography; procedure and applications.</p> <p>Column chromatography- Introduction, principle, working, adsorbents, solvents, factors affection column efficiency.</p> <p>TLC (Thin Layer Chromatography)-Introduction, principle, stationary phase, mobile phase, solvent system, procedure of development, Rf value, Applications of TLC and HPTLC.</p>	15
Unit III	<p>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</p> <p>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-</p> <p>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.</p>	15

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Recommended books

Sr. 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 Particals by J.B. Yadav
16.	Advanced practical physical chemistry by Goel.
17.	Analytical Chemistry by Khopkar

Paper III
Advanced Forensic Physics
Semester: -III (BFS3T3)

Max Marks: - 50

Unit	Contents	No. of Lectures
Unit I	<p>Instrumentation Electronics: Introduction to electronic components- Passive component; Resisters, 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.</p> <p>Wave form Generators- Working Principle of oscillators, Wave form generators; sine, square, triangular, saw tooth.</p> <p>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.</p> <p>Active Filters- Low pass, High pass, Band pass, All pass filters.</p> <p>Signal Converters- ADC, DAC and counters.</p> <p>Wave Shaping Circuits- Wave Clipping, Clamping circuits and Timer circuits.</p>	15
Unit II	<p>Transducers and Measuring Devices: Transducers -Electrical transducers, Strain Gauge, Resistance thermometer, Thermistors and its applications, Integrated Circuit Temperature Transducers,</p>	15

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	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.	15

Recommended books

Sr. 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.

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Paper IV
Advanced Forensic Biology
Semester: -III (BFS3T4)

Max Marks: 50

Unit	Contents	No. of Lectures
Unit I	<p>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.</p>	15
Unit II	<p>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.</p> <p>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.</p>	15
Unit III	<p>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,</p> <p>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.</p>	15

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Recommended books

Sr. 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. ArchanaTripathi
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 4 th edtn. : Benjamin A Pierce., W. H Freeman and company, NewYork
11.	Molecular biology: Fundamentals of molecular biology: Avinash and KakoliUpadhyay, 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 6 th edtn: 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- AvinashUpadhay
18.	Cell biology- Gerald Karp.
19.	The human genome source book- Tara Acharya and NeerajaSankaran
20.	Genetics – Snustad and Simmons
21.	Indian Medicinal plants – Kiritkar and Basu
22.	Practical Botany- Bendre

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Paper V
Advanced Forensic Psychology
Semester – III (BFS3T5)

Max Mark: 50

Unit	Contents	No. of Lectures
Unit I	<p>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.</p> <p>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.</p>	15
Unit II	<p>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.</p> <p>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.</p>	15
Unit III	<p>Perspective of Criminal Behavior and Legal Proceedings: - Psychobiological Approaches, Psychological Approaches- Emotional Deprivation, Psychological Motives of Crime, Frustration, Attitudes, Peer Influence.</p> <p>Psychological Disorder - Psychosis, Neurosis.</p> <p>Social Perceptive – Differential Association theory, Labeling theory, Critical theory, Control theory.</p> <p>Application of Forensic Psychology in Civil and Criminal Legal Proceedings-</p> <p>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.</p> <p>Criminal Proceedings-Competency to stand trial, Criminal responsibility and insanity defense, Risk assessment, Evaluation of Eyewitness testimony, Psychotherapeutic and Counselling services.</p>	15

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Recommended books

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

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Paper VI
Advanced Digital and Cyber Forensic
Semester – III (BFS3T6)

Max Marks: 50

Unit	Contents	No. of Lectures
Unit I	Cyber Forensic: 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.	15
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, Filecvt 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)	15
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	15

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Recommended books

Sr. 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
Criminal Procedure Code
Semester – III (BFS3T7)**

Max Marks: 50

Unit	Contents	No. of Lectures
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.	15
Unit II	Investigation proceedings: Initiation of investigation proceedings (Secs.154-157); Interrogation powers of police officer (Secs.160and 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).	15
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	15

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(Secs.200-203); Inquiry proceedings before magistrates (Secs.204-209); Bail provisions (Secs.436-450).
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Recommended books

Sr. 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.	Forensic science in criminal investigation and trail by B R Sharma.
6.	Medical Jurisprudence and Toxicology by Jaysingh Modi
7.	Forensic Medicine and Toxicology by Parikh

Paper VIII
Law of evidence
Semester – III (BFS3T8)

Max Marks: 50

Unit	Contents	No. of Lectures
Unit I	<p>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.</p> <p>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</p> <p>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)</p>	15
Unit II	<p>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”</p>	15

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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.	15
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Recommended books

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

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SEMESTER IV**Paper I
Advanced Forensic Science
Semester: -IV (BFS4T1)****Max Marks: 50**

Unit	Contents	No. of lectures
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.	15
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.	15
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	15

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	(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.	
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Recommended Books:

Sr. 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.	Introduction to criminalistics by Richard Saferstein.
12.	Handwriting and fingerprint analysis in criminal trail and investigation by B L Bansal and Rajiv Raheja.
13.	Forensic science in criminal investigation and trail by B R Sharma.
14.	Advances in fingerprint technology, 2 nd edition, Henry C Lee and R E Gaensslen.
15.	Fingerprint analysis and understanding, by Mark R Hawthorne.
16.	Fingerprint revolutionized with illustration by F Brewster.
17.	Firearms and fingerprint by Edward Hueske.
18.	Fingerprint identification by SurinderNath.
19.	Forensic science and its related issues by V N Sehgal and SurinderNath.
20.	Footwear impression evidence, detection, recovery and examination by William J Bodziak.
21.	Forensic medicine and jurisprudence by S K Singhal.
22.	Interpretation of blood stain evidence at crime scene. Second edition – William Eckert, Stuart James
23.	Bloodstain pattern analysis with introduction to crime scene reconstruction. Third edition. - Tom Bevel, Ross Gardner.
24.	Forensic Science: An Introduction to Scientific and Investigative Techniques, Third Edition - Stuart H. James, Jon J. Nordby, Suzanne Bell
25.	Criminalistics: An Introduction to Forensic Science (10th Edition)-Richard Saferstein
26.	The Essentials of Forensic Medicine and Toxicology – Dr. KSN Reddy

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Paper II
Advanced Forensic Chemistry
Semester: -IV (BFS4T2)

Max Marks: - 50

Sr. No.	Contents	No. of Lectures
Unit I	<p>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</p> <p>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.</p> <p>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.</p>	15
Unit II	<p>Forensic Chemistry: Screening, sampling-methods: type (collection), introduction, statistical method, different standard methods, errors and precision.</p> <p>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)</p> <p>Micro-chemical method: spot test of (Ni, Co, Fe, As, Pb and Hg) principle and procedure.</p> <p>Cement: Introduction, types of cements, composition, preparation by rotary Kiln method, and analysis of Portland cement by chemical method.</p>	15
Unit III	<p>Chemistry of paints, fertilizers, drugs and alkaloids: - Paints: Introduction, constituents, functions, flash point of paints, separation of pigments, binder and thinner.</p> <p>Fertilizers: Introduction, classification and analysis of fertilizers, Urea, ammonium nitrate, calcium phosphate.</p> <p>Drug: - Introduction, effect of drug, analgesic, antipyretic and anti-inflammatory drug. Ibuprofen, aspirin, paracetamol, diclofenac, morphine, Benzodiazepines.</p> <p>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.</p>	15

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Recommended books

Sr. 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.	S.V.Bhat Natural Product.
9.	John Kenkel, Analytical Chemistry for Technicians.
10.	Feigl, Spot Test in Organic chemistry.
11.	Feigl, Spot Test in Inorganic chemistry.
12.	Vogel's Qualitative Inorganic Analysis.
13.	D.C. Garratt, The Quantitative Analysis of Drugs.
14.	Organic Chemistry by S. Chand
15.	Medicinal chemistry by V. Alagarsa
16.	Practical organic chemistry by Volgel's
17.	Instrumental Analysis by Skoog, Holler and Crouch.
18.	Physical Chemistry Parcticals by J.B. Yadav
19.	Advanced practical physical chemistry by Goel.

Paper III

Advanced Forensic Physics

Semester: -IV (BFS4T3)

Max Marks: - 50

Unit	Contents	No. of Lectures
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 (Improvised 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.	15
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	15

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	blade cut marks, scratch and scour marks. Collection and documentation of tool marks.	
Unit III	<p>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.</p> <p>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.</p>	15

Recommended books

Sr. 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.

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Paper IV
Advanced Forensic Biology
Semester: -IV (BFS4T4)

Max Marks: 50

Sr. No.	Contents	No. of Lectures
Unit I	<p>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.</p> <p>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,</p>	15
Unit II	<p>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). Linnology (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.</p>	15
Unit III	<p>Forensic microbiology: Concept of forensic microbiology, history, introduction to epidemiology, microbial forensic programs (SWGMPF), CDC, case studies, microbes of forensic significance. Types of media: selective, differential, special.</p> <p>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.</p> <p>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.</p>	15

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Recommended Books

Sr. No.	List of books
1.	Basic of spectroscopy- Ball
2.	Manual of clinical microbiology- Murray
3.	Microbiology an introduction 9 th edtn: TortoraFunke, case, Pearson
4.	An introduction to Forensic Genetics 2 nd edtn. William Goodwin, Wiley-Blackwel
5.	Microbiology – Pelczar
6.	Textbook of microbiology: 8 th edtn: Ananthnarayan and Panicker
7.	Roitts Essential Immunology 12 th edtn: Peter Delvis, Wiley-Blackwel
8.	Biotechnology expanding horizon 4 th edtn: 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 2 nd edtn: Richard Saferstein, Pearson
11.	Forensic entomology, 2 nd edtn: 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
Advanced Forensic Psychology
 Semester: – IV (BFS4T5)

Max Mark: 50

Unit	Contents	No. of Lectures
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	15
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	15

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	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.	15

Recommended books

Sr. No.	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 1 st , 2010, Paradise Publishers, Jaipur.
4	'Criminology', DigumartiBhaskara Rao, Edition 1 st , 2012, Discovery Publication House PVT. LTD., New Delhi.
5	'Criminal Profiling-An Introduction to Behavioural Evidence analysis', Brent Turvey, Edition 2 nd , 2006, Elsevier Academic press.
6	'Abnormal Psychology-The Problem of Maladaptive Behaviour', Irwin G. Sarson, Barbara R. Sarson, Edition 11 th , 2012, PHI Publication, New Delhi.
7	'Abnormal Psychology', James N. Butcher, Susan M. Mineka, Jill M. Hooley, Edition 15 th , 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	'Forensic Criminology', Petherick W. A., Turvey B. E., Ferguson C. E., [2010], Elsevier Inc.
11	'Applied Criminology-Concept, Theories and Applications', Joseph Ronald, Edition 1 st , 2013, Cyber Tech publications, New Delhi.
12	'Criminology', Freda Adler, Gerhard O. W. Mueller, William S. Laufer, Edition 1 st , 1991, McGraw-Hill, Inc.
13	'Psychology and Crime', Nageshwar Singh, Edition 1 st , 2013, RBSA Publishers, Jaipur.
14	'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [01], Edition 2 nd , 2013, Global Vision Publishing House, New Delhi.
15	'Social Psychology', Robert A. Baron, Nyla R. Branscombe, Donn Byrne, Gopa Bhardwaj, Edition 12 th , 2010 Pearson Publication.
16	'Social Psychology', Baron R. A., Branscombe N. R., Byrne D., Bhardwaj G., [2009], Twelfth Edition, Pearson Education.
17	'Social Psychology: Exploring Universals Across Cultures' Fathali M. Hoggaddam (1998), W.H. Freeman and Company, New York.
18	'Social theory and social structure' Robert K. Merton., (1981), Amerind Publications & Co., New Delhi.
19	'Psychology', Robert A. Baron, Edition 5 th (2001), Pearson .

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Paper VI
Advance Digital and Cyber Forensic
Semester – IV (BFS4T6)

Max Marks: 50

Unit	Contents	No. of Lectures
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.	15
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	15
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.	15

Recommended books

Sr. 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
7.	Introduction to ANSI C : Narain
8.	Computer Networks by A S Tanenbaum
9.	Database management System by Korth

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Paper VII
Criminal Procedure Code
Semester: – IV (BFS4T7)

Max Marks: 50

Unit	Contents	No. of Lectures
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)	15
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.	15
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	15

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Recommended books

Sr. 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 Law of evidence Semester – IV (BFS4T8)

Unit	Contents	Max Marks: 50	No. of Lectures
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)		15
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)		15
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.		15

Recommended books

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

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PRACTICAL PAPERS (SEMESTER III AND IV)

Practical Paper I - (BFS 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 BFS-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.

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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 BFS-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.	Reconstruction of an old crime scene.
25.	Analysis of blood stains.

Practical Paper II (BFS4P2)

(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 papers BFS-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

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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.(calorimetrically)
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 BFS-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 (BFS 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 BFS-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 Convertor
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.

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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 BFS-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, pallets 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 (BFS4P4)

(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 BFS-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

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	Green (LMG), Luminol Test)
8.	Confirmatory Tests for Blood <ul style="list-style-type: none"> • Crystallization Assays : Teichmann and Takayama
9.	Detection of α -Amylase activity <ol style="list-style-type: none"> Starch-Iodine Assay 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 BFS-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 <ol style="list-style-type: none"> Electrophoresis Precipitin tests Acid Phosphatase test for semen 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 (BFS4P5)

(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 BFS-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

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Sr. No.	Semester IV – List of experiments based on theory paper BFS-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 (BFS4P6)

(Practical based on Theory papers BFS-3T6 and BFS-4T6)

Advanced Digital and Cyber Forensic

Max. Marks - 50

Sr. No	Semester III - List of experiments based on theory paper BFS-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 BFS-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.

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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

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