



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

Syllabus

of

**B.Sc. (Forensic Science)
Third Year**

SEMESTER SYSTEM

FIFTH /SIXTH SEMESTER

Effective from the Academic Year

2015-2016

B.Sc. (Forensic Science) Third Year
Semester V & VI
General curriculum Pattern of the course

Paper	Title of Paper	Marks			Work load Period/Week		
		Semester		Practical (Sem V+VI) (Annually)	Total	Theory	Practical/ batch
		V	VI				
I	Applied Forensic Science	50	50	50	150	4	3
II	Applied Forensic Chemistry	50	50	50	150	4	3
III	Applied Forensic Physics	50	50	50	150	4	3
IV	Applied Forensic Biology	50	50	50	150	4	3
V	Applied Forensic Psychology	50	50	50	150	4	3
VI	Applied Digital and Cyber Forensics	50	50	50	150	4	3
Total		300	300	300	900		

** 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 syllabus having forensic importance. Minimum 12 experiments (semester V and VI Combined) shall be reported in the journal for the purpose of certification. The candidate without certified journal shall not be allowed to appear for the practical examination.*

Curriculum structure and marking scheme for Theory Papers

Semester – V			
Course code	Paper No.	Title of Paper	Marks
BFS-5T1	I	Applied Forensic Science	50
BFS-5T2	II	Applied Forensic Chemistry	50
BFS-5T3	III	Applied Forensic Physics	50
BFS-5T4	IV	Applied Forensic Biology	50
BFS-5T5	V	Applied Forensic Psychology	50
BFS-5T6	VI	Applied Digital and Cyber Forensics	50
		Total	300
Semester –VI			
Course code	Paper No.	Title of Paper	Marks
BFS-6T1	I	Applied Forensic Science	50
BFS-6T2	II	Applied Forensic Chemistry	50
BFS-6T3	III	Applied Forensic Physics	50
BFS-6T4	IV	Applied Forensic Biology	50
BFS-6T5	V	Applied Forensic Psychology	50
BFS-6T6	VI	Applied Digital and Cyber Forensics	50
		Total	300

Curriculum structure and marking scheme for Practical papers

Curriculum structure and marking scheme for practical papers			
Semester – III and IV (Annual Examination)			
Course code	Paper No.	Title of Paper	Marks
BFS-6P1	I	Practical based on papers BFS-5T1 and BFS-6T1	50
BFS-6P2	II	Practical based on papers BFS-5T2 and BFS-6T2	50
BFS-6P3	III	Practical based on papers BFS-5T3 and BFS-6T3	50
BFS-6P4	IV	Practical based on papers BFS-5T4 and BFS-6T4	50
BFS-6P5	V	Practical based on papers BFS-5T5 and BFS-6T5	50
BFS-6P6	VI	Practical based on papers BFS-5T6 and BFS-6T6	50
TOTAL		300	

Examination pattern for theory and practical

The course of study for the B.Sc. Forensic Science examination is divided in six semesters. Semester V and VI will have six 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. Each practical paper will carry **50 marks**.

Theory examination will be of **2 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 shall be 50.

Maximum number of students in a batch for practical at the second year shall consist of 12 students.

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.

Paper I- Applied Forensic Science

Semester: -V (BFS5T1)

Max Marks: 50

Sr. No.	Topic
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Unit-I	<p>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.</p> <p>Forensic Dentistry: Human dentition. Dental numbering system. History of dental identification, ABFO guidelines and standards. Bite mark impressions and its forensic significance.</p>
Unit-II	<p>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.</p> <p>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.</p>
Unit-III	<p>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).</p> <p>Expert testimony: definition of expert, writing report and presentation of evidence in court of law, examination-in-chief, cross-examination and re-examination.</p>

Paper I - Applied Forensic Science

Semester: -V: Practical based on BFS5T1

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

Suggested reading:

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.
14. Specific Guidelines for Accreditation of Forensic Science Laboratories and Checklist for Assessors, National Accreditation Board for Testing and Calibration Laboratories (NABL 113).

**B.Sc. Third year
Paper I
Applied Forensic Science**

Semester: -VI (BFS6T1)

Max Marks: 50

Sr. No.	Topic
Unit-V	<p>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.</p>
Unit-VI	<p>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.</p> <p>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.</p> <p>Infanticide: Introduction, definition and types. Forensic Psychiatry: Introduction and medico legal aspects.</p>
Unit-VII	<p>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</p>

	Forensic Biotechnology.
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Paper I - Applied Forensic Science

Semester: -VI: Practical based on BFS6T1

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

Suggested reading:

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 - Applied Forensic Chemistry

Semester:-V (BFS5T2)

Max Marks: 50

Sr. No.	Topic
Unit-I	<p>Separation and detection technique</p> <p>Gas chromatography: principles, instrumentations and working technique, columns, stationary phases, detectors, Forensic applications and limitations</p> <p>HPLC: Introduction, principle, Instrumentation, working, types of column, detectors, Forensic applications and limitations.</p> <p>Atomic Absorption Spectroscopy- Introduction, principles, Instrumentation and working, cathode lamp, monochromator, detectors, Forensic applications and limitations</p> <p>Flame spectrometry- Principle, Instrumentation and working, Forensic applications and limitations</p> <p>Thermal methods-TGA, DTA, DSC- introduction, instrumentation, working, Forensic applications and limitations</p>
Unit-II	<p>Forensic Toxicology</p> <p>Introduction to toxicology, different branches of toxicology, concepts of forensic toxicology. Scope and application forensic toxicology.</p> <p>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</p>

	<p>opinion.</p> <p>Terpenoids:- i) Introduction, Isolation, Classification. ii) Structure determination, preparation, properties and applications of - Citral, Geraniol, limonene, menthol, alpha-pinene, camphor.</p>
Unit-III	<p>Polymers</p> <p>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.</p> <p>Plastics- Classification of plastics, application of plastics.</p> <p>Rubber- types of rubber, vulcanization of rubber, synthetic rubbers,</p> <p>Fibres: (synthetic fibres)-preparation, classification and properties of polyamides-Nylon, polyesters-Terylene or Dacron.</p> <p>Relevant provisions of:</p> <p>The Poisons Act, 1919, and Section 284 of IPC, 1860 (Negligent conduct with respect to poisonous substance).</p> <p>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),</p> <p>Explosive Substances Act 1908, (Definition, Offences and Penalties).</p>

Paper II - Applied Forensic Chemistry

Semester: -V Practical based on BFS5T2

Sr.No	Name of the practical	No.
1.	Identification of food adulteration.-vegetable oil, Cold drinks etc.	2 nos.
2.	Quantitative or qualitative study of drug opiates.	2 nos.
3.	Examination of fire arson cases by GC, TLC.	1 nos.
4.	Detection and determination of various adulterants in alcohol, by colour tests.(Qualitative analysis)	2 nos.
5.	Chemical analysis of explosive materials.(Gun powder)- Colour test, Microscopic examination	2 nos.
6.	Analysis of alcohol from blood (quantitative by GC).	2 nos.

Paper II - Applied Forensic Chemistry

Semester: -VI (BFS6T2)

Max Marks: - 50

Sr. No.	Topic
Unit-IV	Narcotic Drug and Psychotropic Substances

	<p>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.</p> <p>Characterization and synthesis of nicotine, cocaine and their derivatives.</p>
Unit-V	<p>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. Anthracine - structure determination, resonance, isolation, physical, chemical properties and uses. synthesis, physical, chemical properties and uses of Anthraquinone and Alizarine.</p>
Unit-VI	<p>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>Butter</i>-water, 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.</p>

Paper II - Applied Forensic Chemistry

Semester: -V Practical based on BFS6T2

1.	Extraction methods of drugs, Poisons.	2 nos.
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2.	Colour Tests for identification of poisons, drugs.	2 nos.
3.	Plant, animal, Metallic poison analysis.	2 nos.
4.	Polymer Testing.	
5.	Separation of Sampling Material by TLC (drugs, poison etc.)	2 nos.
6.	Study of Steroids (separation by TLC).	
7.	Examination of chemicals used in Trap cases by UV-visible spectroscopy.	2 nos.
8.	Examination of other metal.	1
9.	Estimation of CaO in the given sample of Portland cement by gravimetric method.	1

Suggested reading

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: Applied Forensic physics

Semester V:- (BFS5T3)

Max Marks – 50

Unit	Topic
Unit- I	<p>Experimental Techniques-</p> <p>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.</p> <p>Magnetic Measurements: Magnetic susceptibility and it's measurement by Quinck's and Gouy's method, Hall Effect and related measurements.</p> <p>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,.</p> <p>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.</p> <p>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.</p>
Unit-II	<p>Causes and Investigation of Vehicular Accidents-</p> <p>Road Terminologies: Cut, Final Grade, Surface, Existing Grade, Fill, Sub grade, Base, Traffic lane, Travelled way, Shoulders, Roadbed, Roadway, Roadway</p>

	<p>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.</p> <p>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.</p> <p>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.</p>
Unit-III	<p>Elementary Ballistics-</p> <p>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.</p> <p>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.</p> <p>Shotgun Ballistics- Shotguns, Strength of the firearm, Jump and vibration, Recoil, Patterns, Stringing, Wounding power.</p>

Paper III - Applied Forensic Physics

Semester: -V Practical based on BFS5T3

Sr.No	Name of the practical
1	Photographic technique by using SLR/ Digital camera.
2	Development of 35 mm photograph.
3	Analysis of accident / crime scene photography
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 it's characteristics.
1 0 .	Study of optical fiber communication system.
1 1 .	Working with Gieger Muelier counter.
1 2 .	Analysis of XRD pattern.
1 3 .	Study of road design and road measurements.
1 4 .	Examination of tire/ other marks
1 5 .	Physical examination accidental vehicle.
1 6 .	Peripheral vision measurement.
1 7 .	Study of effect of a pressure on metal disc and its co-relation with barrel pressure.
1 8 .	Trajectory simulation (sample calculations).

Suggested reading-

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-III Applied Forensic physics

Semester –VI (BFS6T3)

Max Marks – 50

Unit	Topic
Unit- I	<p>Footwear Impressions-</p> <p>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.</p> <p>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.</p> <p>Enhancement of Footwear Impressions: Specialized lighting and photographic methods, Chemical enhancement, Other enhancement techniques.</p>
Unit-II	<p>Forensic Microscopy-</p> <p>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).</p> <p>Introduction to: Environmental Scanning Electron Microscope (ESEM), Auger Electron Spectroscopy (AES), X- Ray Photoelectron Spectroscopy (XPS) , Secondary Ion Mass Spectrometer (SIMS), X- Ray Fluorescence</p>

	(XRF), Atomic Force and Tunneling Scanning Microscope (AF & TS), Phase contrast Microscope and Digital Microscope.
Unit-III	<p>Forensic Applications in Trace Analysis-</p> <p>Physical properties of materials: temperature, weight and mass, density, refractive index and their forensic importance.</p> <p>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.</p> <p>Soil: Significance of soil evidence, Variations in soil, Collection and preservation of soil evidence, Forensic examination of soil.</p> <p>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.</p> <p>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.</p> <p>Plastic: Classification of plastics according to thermal and mechanical property, Plastics in common use.</p>

Paper III - Applied Forensic Physics
Semester: -VI Practical based on BFS6T3

Sr.No	Name of the practical
1 .	Photography of 3-D /2- D shoe/bear 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.
1 0 ·	Examination of coins/metal pieces/wires/tools/bullets/palettes/ cartridges/ under ballistic comparison microscope along with photography.
1 1 ·	Examination of fibers under biological microscope along with photography.
1 2 ·	Examination of soil sample using soil testing kit.
1 3 ·	Comparison of soil/glass using density gradient column method.
1 4 ·	Study of glass fractures due to impacts / heat.
1 5 ·	Study the refractive index of glass samples.
1 6 ·	Determination of density of solid material by volume displacement method.
1 7 ·	To perform Thermal Decomposition test (TDT) test on soil sample.
1 8 ·	Microscopic examination of paint sample.
1 9 ·	Examination of plastic evidences under comparison microscope.
2 0 ·	Stress / Breaking point determination.

2 1 .	Fiber strength measurements.
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Suggested reading

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:-Applied Forensic Biology

Semester: -V (BFS5T4)

Max Marks: 50

Sr. No.	Topic
Unit-I	<p>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</p> <p>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.</p>
Unit-II	<p>Wild life forensic and forensic ornithology:</p> <p>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.</p>

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.
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Paper IV:-Applied Forensic Biology

Semester: -V Practical based on BFS5T4

Sr.no	Name of the Practical
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.

1 1.	To determine species of origin from blood
1 2.	Identification and culture of bacteria of forensic significance.
1 3.	Isolation of <i>Aspergillus flavus</i> and identification of its toxin by fluorescence
1 4.	Identification of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants
1 5.	Identification of birds from feathers.
1 6.	Study of pollen grains and spores of forensic significance.
1 7.	Examination of fur, nails, horn, teeth
1 8.	Examination of hair of different animals such as Dogs, Cats, Cow, Horse, Goats etc.
1 9.	Determination of human hair morphology.

Suggested reading:

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, SanDiego, 2002
14. Medical microbiology by Ananthnarayan
15. Manual of Clinical microbiology
16. Handbook of toxicology of chemical warfare agents ed by Ramesh Gupta

Paper IV:- Applied Forensic Biology

Semester: -VI (BFS6T4)

Max Marks: 50

Sr. No.	Topic
Unit-IV	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-V	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 alkalsis Disorders of Metabolism: <ol style="list-style-type: none">1. Carbohydrate metabolism: Diabetes mellitus, glycogen storage disease2. Lipids: Hypercholesterolemia3. Blood: Thalassemia, sickle cell anemia4. Amino acids: phenolketonuria, alkaptonuria, tyrosemia5. 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-VI	Forensic Entomology Introduction & History, Identification of insects, Training required, Determination of Time elapsed since death, Dipterans Larval Development, Successional 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.

Paper IV:- Applied Forensic Biology

Semester: -VI Practical based on BFS6T4

Sr.no	Name of the Practical
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
8	Amplification of DNA by Polymerase chain reaction (PCR)
9	DNA quantification by Gel electrophoresis
10.	Karyotyping for genetic diseases
11.	Microscopic study of Sickle cell anemia and Thallesemia blood samples
12.	Effect of displacement of body on life cycle of blow flies
13.	Study of microscopic and physiologic characteristics (Size, shape, pH, etc.)of normal and abnormal blood

Suggested Books:

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

Applied Forensic Psychology

Semester V (BFS5T5)

Max Marks: 50

Sr. No.	Topic
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<p>Unit-I</p>	<p>Investigative psychology</p> <p>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</p> <p>Psychological Autopsy- Manner of Death Defined, Types of Psychological Autopsies.</p> <p>Modus Operandi- Nature, Elements of Modus Operandi, Modus Operandi Risk-Low MO risk and High MO risk.</p>
<p>Unit-II</p>	<p>Causes of Criminal Behavior and Psychological Therapies</p> <p>Major Disorders and it's Symptoms and Features-</p> <p>ADHD, Conduct Disorder, Antisocial Personality Disorder, Sexual Disorder, Substance-Use Disorder-Substance Dependence, Substance Abuse.</p> <p>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.</p>
<p>Unit- III</p>	<p>Rehabilitation & Counselling:</p> <p>Rehabilitation- Models of Rehabilitation- Psychiatric Rehabilitation, Psychological Rehabilitation, Cognitive Rehabilitation and Social Rehabilitation.</p> <p>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.</p> <p>Characteristic of Counsellor, Type of counselling: Crisis, Preventive</p> <p>Skill to counsel criminal</p>

Paper V : Applied Forensic Psychology

Semester V Practical based on BFS6T5

Sr. No.	Practical
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. Eyesenk

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, Editon 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, RBSA 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 V Applied Forensic Psychology

Semester VI (BFS6T5)

Max Marks: 50

	Topic
Unit-IV	<p>Stress and Police Psychology</p> <p>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</p>
Unit – V	<p>Crime and Delinquency</p> <p>Psychology of crime & Delinquency, Juvenile Delinquency: Definition, Concept.</p> <p>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, Self-regulation skills & Executive 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,</p>
Unit – VI	<p>Psychology & court</p> <p>Mc Naughten rule, Insanity – Nature of Insanity, Insanity Assessment, Personality Assessment of Offender. Competency to stand trial, Risk</p>

	<p>Assessment, Sentencing Evaluation, The mentally ill in Court.</p> <p>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.</p>
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Paper V

Applied Forensic Psychology

Semester VI Practical based on BFS6T5

Sr. No.	Practical
1	Self Concept Questionnaire – <i>Dr. Rajkumar Saraswat.</i>
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

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 - Applied Digital and Cyber Forensics

Semester:-V (BFS5T6)

Max Marks: 50

Sr. No.	Topic
Unit-I	<p>HTML : Introduction , Basic Tags, Elements, Attributes, Attributes, Formatting , Phrase Tags , Meta Tags , Comments, Images ,Tables, Lists, Frame, Iframe, Fonts, Colors, Forms, Embed Multimedia ,Marquees , Headers.</p> <p>CSS: Introduction, Content and Style, CSS 1 Rules , Length, Percentage, Color and URLs, Font Properties, Color and Background Properties, Text Properties, Box Properties, Classification Properties, Structure and Control, Linking Style Sheets to HTML.</p> <p>JavaScript: Introduction, Syntax, statements, comments, variables , Operators , Data types, control structure, Function, Array, Errors.</p>
Unit II	<p>PHP : Introduction , Environment , Syntax , Variable Types , Constants , Operator Types , Decision Making ,Loop ,Arrays, String, Web Concepts, Methods, File System, Functions, Cookies, Sessions, Sending Emails, File Uploading.</p> <p>MySql: Introduction, Installation, Syntax, Connection, SQL statements (DDL and DML), Temporary Tables, Handling Duplicates, SQL Injection, Data base export, Data base Import</p>
Unit III	<p>Multimedia Forensics: Introduction to multimedia forensics, basic concepts of image, video and audio, digitization and representation of image, video and audio: Shannon's sampling theorem and nyquist frequency.</p> <p>Various recording devices and its characteristics, concepts of noise and construction of filter for their removal, nature and types of forgery related to multimedia and its authentication. Investigation of crime scene in reference to multimedia evidences.</p>

Paper VI

Applied Digital and Cyber Forensic

Semester V Practical based on BFS5T6

1. Create a Simple web page using HTML basic Tags
2. Develop an HTML document for a web page of about your Department. Design the page with an attractive background color, text color and background image.
3. Write an HTML document with an example of Ordered List and Unordered List.
4. Write an HTML document with an example of Table format to print your Bio-Data.
5. Write the Frameset tags and Frame tags for the following frameset.

6. Write an HTML code for designing the subscription form of mail account in the e-mail Website with appropriate fields.
7. Write an example of Style Sheet.
8. Installation WAMP server and configure PHP and MySQL
9. Write a program in PHP to calculate six subject Marks using GET or POST methods.
10. Write a program in PHP to calculate factorial using function.
11. Create a simple Database of any organization using MySQL
12. To represent an audio file in terms of waveform and their subsequent study for low level tampering.
13. To study an image file in view of tampering.
14. To determine number of shots in a given video file.
15. To study the noise pattern of a given recording device and its linkage with corresponding multimedia files.

Paper VI - Applied Digital and Cyber Forensics

Semester:-VI (BFS6T6)

Max Marks: 50

Sr. No.	Topic
Unit IV	<p>Cyber Forensics Investigation and Technical issues: Cyber Forensics Investigation: Introduction, Basic Steps, Crime scene investigation in view of cybercrime, collection and preservation of digital evidences, safely measures for handling original media, search and seizure of computers and related evidences. Incident response and Forensic analysis. Investigating Tools, Investigation of E-Mails and social media accounts: E-Mail Tracking, IP Tracking, and E-Mail Recovery.</p> <p>Advanced Tools for Investigating Cyber crime: OS Forensic Tool: Introduction to Forensic Tool Kit (FTK), SoloImage Master, Disk Locker, FRAT (Forensic Registry Analysis Tool).</p>
Unit V	<p>Digital evidences and Data Recovery: Digital evidences: Digital Evidence on Operating systems (Window/Unix), Mobile Forensics: The Cell Phone, PDA and GPS Devices, Mobile Edit, ,CDR(call data Recorder).Challenges to digital forensic evidences-Basics, Identifying evidence, collection of evidence, Seizure error, Transport of evidence- Possession and chain of custody, Searching and seizure of computer related evidences. Storage of evidences, evidence Analysis. Processing of evidences and preparations of report.</p> <p>Data Recovery: Disk Geometry, Data Recovery Procedures, Recovery of Internet Usage Data, Recovery of Swap Files/Temporary Files/Cache Files, Recovery-Formatted Partition Recovery, Data Recovery Tools. Computer Ethics and Cyber Ethical Values for Digital Frontier.</p>
Unit VI	<p>Information Technology Act (IT Act 2000): Introduction, definitions of computer, computer system, computer network, electronic record, data, secure system, digital signature and certifying authority as per IT Act. Authentication of electronic records (Section-3), legal recognition of electronic records and digital signature (Section-4 and 5), Certifying Authorities and Controller, Offences as per IT Act (Section-65 to Section-78), Special provision in Indian Evidence Act regarding admissibility of electronic records (Section-65B of IEA, 1872).</p>

Paper VI

Applied Digital and Cyber Forensic

Semester VI Practical based on BFS6T6

1	Data Recovery integrated with forensic technology using Open Sources (2 nos.)
2	Mobile Forensic using forensic suite of tools (2 nos.)
3	To study Computer Forensic Investigation Tools, (2 nos.)
5	Creation and verification of Digital Signature (2 nos.)
6	Hardware Data Recovery-Salvation DATA Tools (2 nos.)
7	Network Analysis using Command prompt (2 nos.)
8	Detail Analysis of E-mail, E-Mail Investigation, E-Mail Tracking and IP Tracking (1 no.)
9	Working on EnCase Software: Make Forensic image and subsequent analysis (2 nos.)
10	Imaging of discs using various tools (2 nos.)
11	Hands on Photoshop, Paints, etc For Image Editing purposes (2 nos.)
12	Use of Stenography tool to hide information- (Open source tools) (2 nos.)
13	Use of Hash values for evidence authenticity using Hex and Helix tools (2 nos.)

Suggested readings:

1. [HTML and CSS: Design and Build Websites](#) by [Jon Duckett](#)
2. [Web Design with HTML, CSS, JavaScript and jQuery Set](#) by [Jon Duckett](#)
3. Learning MySQL by [Seyed M.M. \(Saied\) Tahaghoghi](#)
4. Murach's MySQL by Joel Murach (Author)
5. Multimedia Forensics and Security, Chang-Tsun Li, Taylor and Francis, 2013.
6. Digital Image Processing, R. C. Gonzalez, Peason Publishers, 2008.
7. Handbook of Image and Video Processing, Alan C. Bovik, Elsevier Publishers, 2005.
8. Overview of Audio Forensics, Robert C. Maher, Springer, 2010.
9. File System Forensic Analysis by Brian Carrier, Publisher: Addison-Wesley Professional
10. Cyber Law & Crimes (IT Act 2000 & Computer Crime Analysis) by Barkha & Ram Mohan, Publisher: Asian Law House, Hyderabad
11. Cyber Crime – Dr. R C Mishra, Publisher: Authorspress
12. Forensic Science in Crime Investigation Dr. Rukmani Krishnamurthy, Publisher: Selective & Scientific Books
13. Handbook of Security, Cryptography & Digital Signature
14. Forensic Science – From the Crime Scene to the Crime Lab by Richard Saferstein
15. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill
16. Cyber Law and E .Commerce, David Baumer, J C Poindexter, TMG Cyberlaw Simplified
Vivek Sood, TMG

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