



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

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

Three Year Degree Program

Semester Pattern

Semester V and VI

Effective from
Academic year 2021-22 onwards

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

General curriculum pattern of the program

Paper	Title of Paper	Marks			Work load Period/Week		
		Theory	Practical	Total	Theory	Practical/ Batch	
		V	VI	(Annually)			
Semester V & VI							
I	Applied Forensic Science	50	50	50	150	3	3
II	Applied Forensic Chemistry	50	50	50	150	3	3
III	Applied Forensic Physics	50	50	50	150	3	3
IV	Applied Forensic Biology	50	50	50	150	3	3
V	Applied Forensic Psychology	50	50	50	150	3	3
VI	Cyber Security	50	50	50	150	3	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 syllabi having forensic importance. Minimum 12 experiments shall be reported in the journal for the purpose of certification.**

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

Curriculum structure and marking scheme of theory papers

Semester-V

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

Semester-VI

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

Curriculum structure and marking scheme of practical papers

Semester-V and VI (annual examination)

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

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Examination pattern for theory and practical

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

Structure of Class and practical examination

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

Standard of Passing and Award of Division

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

SEMESTER-V

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

Max Marks: 50

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

	impressions and its forensic significance.
Unit-II	<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>

Suggested readings:

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

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

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

Max Marks: 50

Unit	Contents
Unit-I	<p>Separation and detection technique Gas chromatography: principles, instrumentations and working technique, columns, stationary phases, detectors, Forensic applications and limitations HPLC: Introduction, principle, Instrumentation, working, types of column, detectors, Forensic applications and limitations. Atomic Absorption Spectroscopy- Introduction, principles, Instrumentation and working, cathode lamp, monochromator, detectors, Forensic applications and limitations Flame spectrometry- Principle, Instrumentation and working, Forensic applications and limitations Thermal methods-TGA, DTA, DSC- introduction, instrumentation, working, Forensic applications and limitations</p>
Unit-II	<p>Forensic Toxicology 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 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 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</p>

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Plastics- Classification of plastics, application of plastics.
Rubber- types of rubber, vulcanization of rubber, synthetic rubbers,
Fibres: (synthetic fibres)-preparation, classification and properties of
polyamides-Nylon, polyesters-Terylene or Dacron.

Relevant provisions of:

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

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

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

Suggested Readings:

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

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

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

Max Marks: 50

Unit	Contents
Unit-I	<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 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- General- Energy considerations, Propellants, Initiation, Combustion of propellants, Density of loading, Atmospheric temperature, Shape of the cartridge case. Heat problems, Barrel pressure and its determination, Recoil, facts and measurement, Vibration and jump, Barrel fouling. Exterior Ballistics- Trajectory formation, Vacuum trajectories, Range, Experimental determination and shape of trajectory, Spin, Drift, Angle of fire, Structure of the projectile, Sectional density, Influence of earth and escape velocity, Air resistance, Retardation, Wind deflection, Firing guns in the air, Ricochet. Shotgun Ballistics- Shotguns, Strength of the firearm, Jump and vibration, Recoil, Patterns. Stringing, Wounding power.</p>

Suggested Readings:

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

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

Max Marks: 50

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

Suggested Readings:

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

Academic Press

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

9. Forensic Science in Wildlife Investigations - Adrian Linaere 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-V (BFC-5T5) Applied Forensic Psychology

Max Marks: 50

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

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

Suggested Readings:

- 1 'Criminal Profiling-An Introduction to Behavioural Evidence analysis', Brent Turvey, Edition 2nd; 2006, Elsevier Academic press.
- 2 'Handbook of Forensic Psychology', Prof Dr. Vimala Veeraraghwan, Edition 1st, 2009, Selective and Scientific Books Publications, New Delhi.
- 3 'Handbook of Forensic Psychology', Irving B. Weiner, Allen K. Hiss, Edition 3rd, 2006, Wiley Publication.
- 4 'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [03], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
- 5 'Theoretical Psychology', Moazziz Ali Beg, Sangeeta Gupta Beg, Vol [04], Edition 2nd, 2013, Global Vision Publishing House, New Delhi.
- 6 'Abnormal Psychology-The Problem of Maladaptive Behaviour', Irwin G. Sarson, Barbara R. Sarson, Edition 11th, 2012, PHI Publication, New Delhi.
- 7 'Abnormal Psychology', James N. Butcher, Susan M. Mineka, Jill M. Hooley, Edition 15th, 2014, Pearson.
- 8 'Theories Of Counseling and Psychotherapy- Systems, Strategies, and Skills', Linda Seligman, Lourie W. Reichenberg, 2010, third edition, Pearson Education
- 9 'Psychological Interventions of Mental Disorders', S. K. Shrivastava, Nayanika Singh, Shivani Kant, Edition 1st, 2013, Sarup Book Publishers, PVT. LTD.
- 10 'Psychology and Crime', Nageshwar Singh, Edition 1st, 2013, 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-VI (BFC-5T6) Cyber Security

Max Marks: 50

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

Suggested Readings:

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

SEMESTER-VI

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

Max Marks: 50

Unit	Contents
Unit-I	<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-II	<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. Injury: Introduction and classification of injury; medico legal aspects of injuries; mechanical injuries-Abrasions, Bruises, Lacerations, Incised wounds, stab wounds, defense wound and self-inflicted wounds; Regional injuries- Head injury, injuries to brain, abdomen and other body parts; accident injuries: vehicular injuries, railway injuries and aircraft injuries; injury due to fall. Thermal injuries: Burn and scalds, Lightning, Electricity and Explosions. Infanticide: Introduction, definition and types. Forensic Psychiatry: Introduction and medico legal aspects.</p>
Unit-III	<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 Forensic Biotechnology.</p>

Suggested Readings:

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

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

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

Max Marks: 50

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

	<p>Combustion, Deflagration and Detonation, Ignition, Initiation and Thermal Decomposition, preparation of picric acid, Trinitrotoluene, TATB (1,3,5-Triamino-2,4,6-trinitrobenzene), HNS (Hexanitrostilbene). Dyes:- introduction classification, colour and structure, theories of dyes, synthesis of dyes, azo dyes, triphenylmethane dyes, phthalein dyes, indigotin dyes, application. Anthracene - structure determination, resonance, isolation, physical, chemical properties and uses. synthesis, physical, chemical properties and uses of Anthraquinone and Alizarine.</p>
Unit-III	<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>Butterwater</i>, salt, curd, lactose, fat, ash. Pesticides: Introduction, Classification, synthesis of DDT, Malathion, BHC, Parathion, applications. Relevant provision of:- Prevention of Food Adulteration Act 1954 (Definition, Power of Food Inspector, Offences and Penalties), Narcotic Drugs & Psychotropic Substances Act 1985 (Definition, Licit Opium Cultivation, Minimum and Commercial Quantity in Narcotic Drugs, Offences and Penalties), Prevention of Illicit Trafficking in NDPS Act 1985 (Detention of a Person Under the Act), Drugs Control Act 1940 (Definition, Power of Chief Commissioner Under the Act), Drugs & Cosmetics Act 1945 (Definition, Adulterated, Misbranded, Spurious Drugs and Cosmetics, Offenses and Penalties), Arson cases.</p>

Suggested Readings:

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

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

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

Max Marks: 50

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

	Enhancement of Footwear Impressions: Specialized lighting and Photographic
Unit-II	<p>Forensic Microscopy- Basics of microscope, common terms used in microscopy, Construction, working, applications and limitations of -Compound microscope, Comparison microscope, Stereomicroscope, Polarizing microscope, Micro spectrophotometer, Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM).</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 (XRF), Atomic Force and Tunneling Scanning Microscope (AF & TS), Phase contrast Microscope and Digital Microscope.</p>
Unit-III	<p>Forensic Applications in Trace Analysis- 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>

Suggested Readings:

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

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

Max Marks: 50

Unit	Contents
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<p>Unit-I</p>	<p>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</p>
<p>Unit-II</p>	<p>Clinical Biochemistry and Genetic Analysis: Fluid electrolyte homeostasis in the body: Role of water, electrolytes in the body, hydrogen ion concentration and buffer, regulation of blood, pH, disorder of Acid-base balance acidosis and alkosis Disorders of Metabolism: 1. Carbohydrate metabolism: Diabetes mellitus, glycogen storage disease 2. Lipids: Hypercholesterolemia 3. Blood: Thalassemia, sickle cell anemia 4. Amino acids: phenolketonuria, alkaptonuria, tyrosemia 5. Purine and pyrimidine: Lesch-Nyan syndrome, Gout diseases, SCID Renal function test, liver function test, pancreatic function test, Gastric function test, thyroid function test, detoxification.</p>
<p>Unit-III</p>	<p>Forensic Entomology Introduction & History, Identification of insects, Training required, Determination of Time elapsed since death, Dipterans Larval Development, Succession colonization during the process of decomposition of body, Determination of displacement and disturbance of the body, Presence and Position of wounds, Drugs consumption, Human & Animal neglect or abuse, Collection of entomological evidence, Challenges encountered in Entomology, Report Submission, Testifying in Court.</p>

Suggested Readings:

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

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

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

Max Marks: 50

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

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

Suggested Readings:

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

Paper-VI (BFC-6T6) Cyber Security

Max Marks: 50

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

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

Suggested Readings:

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

PRACTICAL PAPERS (SEMESTER V AND VI)

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

Practical Paper I - (BFC-6P1)

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

Applied Forensic Science

Max Marks: - 50

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

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

Practical Paper II - (BFC-6P2)

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

Applied Forensic Chemistry

Max Marks: - 50

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

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

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

Practical Paper III - (BFC-6P3)

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

Applied Forensic Physics

Max Marks: - 50

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

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

Practical Paper IV - (BFC-6P4)

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

Applied Forensic Biology

Max Marks: - 50

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

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

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

Practical Paper V - (BFC-5P5)

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

Applied Forensic Psychology

Max Marks: - 50

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

Sr. No	Semester: -VI List of experiments based on theory paper BFC-6T5
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

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

Max Marks: - 50

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

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

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

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

Aashirfade

 2/10/22