ADIKAVI NANNAYA UNIVERSITY
B.Sc. Forensic Science
w.e.from 2018-19 Admitted Batch

Eligibility : Intermediate Examination (10+2 pattern) with Mathematics, Physics and Chemistry and Bi.P.C/PUC with Science group. Diploma with Mathematics, Physics and Chemistry (any two of this)

Table-1: B.Sc Forensic Science SEMESTER – I

Paper No.	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours	Credits
1	First Language English	100	25	75	4	3
2	Foundation Course - 1 HVPE (Human Values & Professional Ethics)	50	0	50	2	2
3	Foundation course -2 Communication & Soft Skills -1	50	0	50	2	2
4	Introduction to Forensic Science and Criminology	100	25	75	4	3
5	Various Divisions of Forensic Science Laboratory	100	25	75	4	3
6	Forensic science Lab-1	50	0	50	2	2
7	Fundamentals of Computers	100	25	75	4	3
8	Fundamentals of Computers Lab	50	0	50	2	2
9	Inorganic Chemistry & Organic Chemistry- 1	100	25	75	4	3
10	Chemistry Lab- 1	50	0	50	2	2
Total		750			30	25

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Paper-1: First Language English

Paper-2: Foundation Course - 1 HVPE (Human Values & Professional Ethics)

Paper-3: Foundation course -2 Communication & Soft Skills -1

Paper-4: Introduction to Forensic Science and Criminology:

Unit-1: Forensic science- Introduction - Basic terminology- Forensic Science Laboratories in India &Worldwide- History- Principles of Forensic science with Examples - Forensic Science Laboratories and other allied institutions (FSL, CFSL, GEQD, FPB CDFC, NIA, CDTS, CCMB, IICT, NINetc).

Unit-2: Criminology - Introduction, scope of criminology- History – Famous criminologists- Definition of crime, criminal behaviour- types of crimes, causes of crime, Juvenile delinquency, criminal profiling.

Penology- Introduction- Administration- Theories of Punishment, Types of Punishments, Prisons and Correctional Institutions, , Functions and Limitations.

Unit-3: Indian Courts- Introduction, Hierarchy of courts- Powers of courts, types of courts, Lok Ayukta & Lok Adalat, etc. Role and responsibilities of Public Prosecution – Defence Council -Admissibility of Expert Testimony –Expert Evidence fallacies- Definition & Value of Expert Testimony.

Unit-4: Criminal justice system in India- Introduction, Administration of civil and criminal justice system. Introduction to constitution of India- Indian Penal Code(IPC), Criminal Procedure Code (Cr.PC) and Indian Evidence Act (IEA).

Unit-5: Different agencies involved in Crime Detection-Introduction to Various Investigative agencies-History-Development-Functions of- Police, Central Bureau of Investigation (CBI),Criminal Investigation Department (CID), Intelligence Bureau(IB), Research Analysis Wing (RAW), CRPF, BSF, SPG, NIA etc.

Paper-5: Various Divisions of Forensic Science Laboratory.

Unit-1: Physics Division
(A) Physics Section: Glass Fracture studies, Glass pieces and fragments, Paint flakes, chips and smears, Footprints, shoe prints, Tyre impressions, Tool marks
(B) Ballistics Section: Firearms, Parts of Firearms, Cartridges, Cartridge cases, Bullets/ Pellets wads & Clothes and other materials affected by firing.
(C) Forensic Engineering: Road/ Train/ Vehicular Accidents Materials, Building Materials such as bricks, Cement, Mortar, Steel, etc
Unit-2: Chemistry Division
(A) Chemistry Section: Explosives, its remnants, Residues, components etc. Arson and Fire residues, Suspected Petrol, Diesel and other Motor oils, Unknown substances in the form of solids liquids or gases, Suspected cosmetics, Toiletry, cement, metals Jewellery, ornaments, Alloys etc, Acid burn cases.
(B) Narcotics Section: Suspected powders, Liquids, Plant products, Toddy, Liquor and their adulteration
(C) Toxicology Section: Viscera, Body fluids, Suspected poisonous substances in plant materials, food, syringes, needles, Tablets, powders etc Bones, Ash, Skin, Vomit, Exhumed remnants
Unit-3: Biology Division
(A) Biology Section: Examination of Hair, Fibres, Diatoms, plants materials, Cigarettes butts, Insects, Flies, Maggots, Human tissues and animal origins etc
(B) Serology Section: Blood, Semen, Saliva, Other body fluids,
(C) DNA Fingerprinting Laboratory: Liquid blood, blood stains, & swabs, semen, Seminal stains, tissues, Bones, Hairs, Teeth, Saliva, Skeletal remains etc. Samples of Animal & Plants origins
Unit-4: General Division
(A) Questioned Documents Section: Examination of Handwriting, Signatures, Erasures, obliterations, Alterations, Overwriting, secret writing, Type writing, printed matter, photocopies, Ink & Paper.
(B) Polygraph Section: Persons viz, Suspects, Witnesses or complainants
(C) Computer Forensic Section: Software, Hardware, Computer peripherals & products, Computer data, Text, Images, Audio & Video files on Storage Media.
Unit-5: Allied Institutes- CCMB Centre for Cellular and Molecular Biology, CFPB- Central Finger print Bureau, IICT- Indian Institute of Chemical Technology, NIN- National institute of Nutrition and NIA- National Institute Agency etc

Paper-6: Forensic science Lab-1:

- Experiments on Locard's principle of Exchange- Glass, Paint, Fingerprints, Blood etc.,
- Examination of blood & blood stains.
- ABO Blood grouping
- Identification of urine
- Identification of saliva
- Identification of semen
- Physical examination of soil.

Paper-7: Fundamentals of Computer:

Unit-1: Basic Computer Knowledge Computer organizations, types of computers, Components of computer, Input Devices Key board, mouse, touch pad and other pointing Devices, Desktop Icons and control panel objects, Operating system types , Creating Files and Folders, Exploring the folders, files, and programs, Editing a document files

Unit-II: Introduction to Computer Networks:Computer networks, Intranet, Surfing the Internet, ISPs and connection types, Search, Email, Virtual communities, Social Networks, Tools on the web

Unit-III: Components of Computer and PrintersIntroduction to the Computer Hardware, Power Supplies, Motherboards, Internal PC Components, External Ports and Cables, Input and Output Devices, Select Computer Components, Safe Lab Procedures, Procedures to Protect Equipment and Data, Proper Use of Tools, Software Tools, Antistatic Wrist Strap, Printers, Installing and Configuring Printers, Configuring Options and Default Settings, Optimizing Printer Performance, Sharing Printers, Print Servers, Maintaining and Troubleshooting Printers, Troubleshooting Printer Issues, Common Problems and Solution

Unit-IV: Computer Assembly:Assemble the Computer, Computer Disassembly, Install the Motherboard, Install Drives, Install Cables, Install the Adapter Cards, Install the Adapter Cards, BIOS Beep Codes and Setup, BIOS and UEFI Configuration, Upgrade and Configure a Computer, Storage Devices, Peripheral Devices

Unit-V: Preventive Maintenance and TroubleshootingPreventive Maintenance and the Troubleshooting Process, PC Preventive Maintenance, Benefits of Preventive Maintenance, Preventive Maintenance Tasks, Clean the Case and Internal Components, Inspect Internal Components, Identify the Problem Probable Cause Test the Theory to Determine, Plan of Action to Resolve the Problem and Implement the Solution

Paper-8: Fundamentals of Computers Lab:

a. Basic Computer Knowledge
b. Introduction to Computer Networks
c. Components of Computer and Printers
d. Computer Assembly
e. Preventive Maintenance and Troubleshooting

Paper-9 Inorganic and Organic Chemistry-1

Inorganic Chemistry
UNIT –I
p-block elements –I
Group-13: Synthesis and structure of diborane and higher boranes
(B4H10 and B5H9), boron-nitrogen compounds (B3N3H6 and BN) and carboranes
Group - 14: Preparation and applications of silanes, silicones and graphitic compounds.
Group - 15: Preparation and reactions of hydrazine, hydroxylamine and Phosphazenes.
UNIT-II

1. p-block elements -II
Group - 16: Classifications of oxides based on (i) Chemical behaviour and
(ii) Oxygen content, Oxyacids of sulphur (structures only).
Group-17: Inter halogen compounds, pseudo halogens and comparision with halogens.
2. Organometallic Chemistry
Definition - classification of Organometallic compounds - nomenclature, preparation, properties and applications of alkyls of Li and Mg.

Organic Chemistry
UNIT-III
Structural theory in Organic Chemistry
Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H2O,NH3& AlCl3).
Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes.
Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.
UNIT-IV

l. Acyclic Hydrocarbons

Alkenes - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H2O, HOX, H2SO4 with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X2, HX, H2O (Tautomerism), Oxidation with KMnO4, OsO4, reduction and Polymerisation reaction of acetylene.

2. Alicyclic hydrocarbons (Cycloalkanes)

Nomenclature, Preparation by Freunds method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

UNIT-V

Benzene and its reactivity -Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO2 and Phenolic).

Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens

(Explanation by taking minimum of one example from each type)

Paper-10: Chemistry Lab- 1

Practical-I Simple Salt Analysis

- Qualitative Inorganic Analysis 50 Marks
- Analysis of simple salt containing one anion and cation from the following
- Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.
- Cations: Lead, Copper, Iron, Aluminum, Zinc, Manganese, Nickel, Calcium, Strontium, Barium, Potassium and Ammonium.

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Table-2: B.Sc. Forensic Science SEMESTER – II

Paper No.	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours	Credits
1	First Language English	100	25	75	4	3
2	Foundation course - 3 Environmental Science	50	0	50	2	2
3	Foundation course – 4 ICT-I Computer Fundamentals and Office Tools	50	0	50	2	2
4	Crime Scene Management	100	25	75	4	3
5	Physical Evidence	100	25	75	4	3
6	Forensic Science Lab- 2	50	0	50	2	2
7	Networking and Security	100	25	75	4	3
8	Networking and Security Lab	50	0	50	2	2
9	Physical & General Chemistry- 2	100	25	75	4	3
10	Chemistry Lab- 2	50	0	50	2	2
Total		750			30	25

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Paper-1: First Language English

Paper-2: Foundation course – 3 Environmental Science

Paper-3: Foundation course – 4 ICT-I Computer Fundamentals and Office Tools

Paper-4: Crime Scene Management:

Unit-1 : Crime Scene Definition, Types of crime scenes: Primary, Secondary & Tertiary, Crime scene Protection – Different types of Crimes- Burglary, Homicide, Suicides, Sexual offences, Accidents etc.

Unit-2: Crime Scene Photography- Introduction to Crime scene photography – History - cardinal rules of CS photography – Basic principles of CS photography – Macro & Micro Photography- Forensic photogrammetry Variations of Photography- Mid range, Close-up , Aerial & over all Photography – EMR photographic techniques – SWGIT – Photo images as evidences – Documentation of Crime scene Photography – Forensic Videography.

Unit-3: Sketching of Crime Scene- Rough Sketch & Fine Sketch- Rectangular Coordinate Method, Polar method, Baseline Method, Triangulation Method etc. optical methods of mapping, 3D laser Scanning.

Unit-4- Processing of Crime Scene- Where to search, what to Search & How to search Crime scene safety: Introduction, Types of hazards-chemical, biological, and physical. Types of Safeties - Routes of exposure- General precautions- Exposures to Violent Crimes, Exposure to Traumatic Incidents, Exposure to Explosion- Personal protective equipments.

Unit- 5: : Crime scene reconstruction- Definition – Nature& Importance - Types of Crime scene reconstruction - Role of pattern analysis in reconstruction. Sequence of events recording, Documentation required for Crime scene reconstruction.

Paper-5: Physical Evidence:

Unit-1: Physical Evidence- Definition- Importance of Physical Evidence -Types of Physical Evidence- Trace Evidence- Identification of Physical Evidence-Sources of Physical evidence-Type of Information to be elicited from Different types of Physical Evidence.

Unit-2: Physical Evidence- Protection & Search methods, Types of search methods- Spiral, Strip or Lane, Grid, Zone and Wheel or Pie methods. General precautions to be taken while collecting Physical Evidence- Collection – Evidence collection equipments, techniques of collection. Chain of Custody.

Unit -3: Handling of Different Physical Evidences, Guidelines for different evidences-Biological evidence, Chemical Evidence, Explosive evidence, Ballistics evidence Digital evidence, Narcotic Evidence, Wild life evidence etc

Unit-4: Packing Materials of Physical Evidence- Lifting of Physical Evidence- Importance of packing materials. Sealing , Marking , & labelling- Letter of advice- Precaution to be taken while transporting Physical Evidence.

Unit- 5: Protection of Physical Evidence- Definition- Importance of Protection of Physical Evidence- General precautions - Types of Preservatives for different Physical Evidence-Blood, Vomit & Viscera etc

Paper-6: Forensic Science Lab - 2

- Search methods for Identification of physical evidence.
- Handling, Lifting & Packing of physical evidence.
- Sealing, Labelling & Preservation of different physical evidence.
- Methods for sketching the crime scene- Rough & Fine Sketch
- Mapping techniques of crime scene- Baseline, Rectangular, Triangulation & Polar techniques.
- Crime scene Photography

Paper-7: Networking and Security:

Unit-I: Operating Systems and Installation: Windows Installation, Operating System Terms and Characteristics, Types of Operating Systems and Operating Systems Upgrade, Operating System Installation, Storage Device Setup Procedures, Custom Installation Options, Boot Sequence and Registry Files, Multiboot Procedures, Disk Management Utility, Windows Configuration and Management, Windows Desktop, Tools and Applications, Control Panel Utilities, Administrative Tools, System Configuration, Disk Defragmenter and Disk Error-Checking Tool, Command Line Tools, Client-Side Virtualization, Common Preventive Maintenance Techniques for Operating Systems

Unit-II: Applied Computer Networking: Computer Networks, Types of Networks, OSI Reference Models, Wired and Wireless Ethernet Standards, Physical Components of a Network, Hubs, Bridges, and Switches, Cables and Connectors, Basic Networking Concepts and Technologies, IP Addresses, IPv4 vs. IPv6, Static Addressing, Dynamic Addressing, Transport Layer Protocols, TCP, UDP, Port Numbers, Computer to Network Connection, Wireless and Wired Router Configurations, Network Sharing, Remote Connections, ISP Connection Technologies, Internet Technologies, Networked Host Services, Common Preventive Maintenance Techniques Used for Networks, Basic Troubleshooting Process for Networks

Unit-III: Laptops and Mobile Devices: Laptops and Mobile Devices, Laptop Components, Laptop Displays, Laptop Configuration, Wireless Configuration, Laptop Hardware and Component Installation and Configuration, Replacing Hardware Devices, Mobile Device Hardware, Common Preventive Maintenance for Laptops and Mobile Devices, Basic Troubleshooting Process for Laptops and Mobile Devices, Mobile, Linux, and OS X Operating Systems, Mobile Operating Systems, Methods for Securing Mobile Device, Mobile Device Synchronization, Configuring Email, Linux and OS X Operating Systems, Basic Troubleshooting Process for Mobile, Linux, and OS X O/S, Common Problems and Solutions for Mobile, Linux, and OS X O/S.

Unit-IV: Network Security: Introduction to Security, Security Threats, Security Procedures, Securing Web Access, Protecting Data, Protection Against Malicious Software, Security Techniques, Protecting Physical Equipment, Common Preventive Maintenance Techniques for Security, Basic Troubleshooting Process for Security

Unit-V: Troubleshooting Computer Networks: Apply Troubleshooting Process to Networks, Apply Troubleshooting Process to Security, Identify and Troubleshooting LAN problems, Cyberwarfare and Network Attacks, Mitigating Cyber Attacks, Troubleshoot Security Problems

Paper-8: Networking and Security Lab

- Operating Systems and Installation
- Applied Computer Networking
- Laptops and Mobile Devices
- Network Security
- Troubleshooting Computer Network

Paper- 9 (Physical & General Chemistry) - II

PHYSICAL CHEMISTRY

UNIT-I: Solid-state - Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravis lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects

UNIT-II:

1. Gaseous state- Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The Vander Waal's equation and the critical state. Law of corresponding states. Relationship between critical constants and Vander Waal's constants. Joule Thomson effect.

2. Liquid state- Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices

UNIT-III

1. Solutions- Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Nonideal solutions. Vapour pressure - composition and vapour pressure- temperature curves. Azeotropes-HCl-H2O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

GENERAL CHEMISTRY

UNIT-IV

l. Surface chemistry: Definition of colloids. Solids in liquids(sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses. Adsorption: Physical adsorption, chemisorption. Freundlisch, Langmuir adsorption isotherms. Applications of adsorption

2.Chemical Bonding: Valence bond theory, hybridization, VB theory as applied toClF3, Ni(CO)4, Molecular orbital theory - LCAO method, construction of M.O. diagrams for homonuclear and hetero-nuclear diatomic molecules (N2, O2, CO and NO).

UNIT-V

Stereochemistry of carbon compounds- Molecular representations- Wedge, Fischer, Newman

and Saw-Horse formulae. Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane. D,L and R,S configuration methods and E,Z- configuration with examples.

Paper-10: Chemistry Practical Lab- 2

Qualitative inorganic analysis

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

Anions: Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

Cations: Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, potassium and ammonium.