National Forensic Sciences University

Knowledge | Wisdom | Fulfilment

An Institution of National Importance
(Ministry of Home Affairs, Government of India)

Syllabi for

Ph.D. Entrance Test

Admission 2025 - 2026

The PhD Entrance test shall comprise of 100 multiple choice questions (MCQs) of one (1) mark each and will have two components:

PART A: Research Methodology (50 MCQs) (common for all)
PART B: Domain Specific Subject (50 MCQs)

Contents

PART – A (Common Paper for All Domains)

1. Research Methods and Statistics

Unit I: Introduction

- Science is a way of thinking- Common methods of acquiring Knowledge- Emerging modern science -Basic assumptions of science-Observation and Interference.
- Scientific Research: Meaning and Characteristics of Scientific Research. Phases in Research. Types of Research – Experimental and Non-Experimental.
- Research Problems: Characteristics, Sources of stating a problem, Types of Problems.
- Hypotheses: Meaning and Characteristics of good hypothesis, types of hypothesis, types of errors. Reliability: Types, Factors influencing reliability.
- Validity: Types and Threat to validity. Research Ethics: Ethical guides for human research, Ethical principles in research with animals, Ethics in reporting research.
- Sampling: Meaning and types of sampling- Factors influencing decision to sample Methods of drawing random samples – Probability sampling techniques, non-probability sampling techniques. Requisites of good sampling method. Common advantages of sampling methods. Sampling Distribution and Sampling errors.

Unit II: Methods of Data Collection

- Observational Research: Classification – Participant Observation, Structured Observation, Field Experiments.
- Sampling Techniques- Time, Even and Situation Sampling. Analysis of Observational Data. Strengths and Weakness of Observational Method. Survey Method: Steps in Survey Research. Survey Methods – Personal Interview, Mail Survey, Telephonic interview, Internet Survey. Strengths and Weakness of Survey Method.

Unit III: Experimental Research

- Basic principles of experimental design – Replication, Randomization and Locus Control.
- Between-groups Design: Two Randomized Groups Design, More than two Randomized Group Design, Matched Group Design.
- Within-groups design – Characteristics, Comparison of Within groups Design and Between group design. Pre experimental design. True experimental design. Quasi experimental design. Ex-post factor design.
- Single Subject Experimental Research: Meaning, origin and General Procedure of single subject experimental research. Basic design of single subject experimental research. Data collection strategies. Evaluating data of single subject experimental research. Strength and weakness of single subject experimental research. Comparison between single subject research and large research.

Unit IV: Data Analysis

- Hypothesis testing: null and alternative hypotheses, Type I & II errors, p-values, significance levels,
- Parametric tests: z-test, t-test (one-sample, two-sample, paired), ANOVA (one-way, two-way, repeated measures),
- Non-parametric tests: chi-square, Mann-Whitney U, Wilcoxon, Kruskal-Wallis,
- Correlation: Pearson, Spearman, partial correlation,
- Simple linear regression: model, assumptions, estimation, interpretation,
- Multiple regression: model building, diagnostics, multicollinearity, Logistic regression for categorical outcomes, One-way and two-way ANOVA, repeated measures ANOVA, factorial designs,
- ANCOVA: concept and application, Post-hoc tests and multiple comparisons

Unit V: Writing Research Report

- Research Report: Structure of research report: Title page-Abstract-Introduction, Objectives-Literature Survey-Methodology-Results-
- Reporting statistics -Presenting data in tables and figures-Discussion-References-appendixes Author note-Foot notes -Order of manuscript pages.
- Oral Presentation of Research Report: Oral presentation -Principles of effective oral presentation. Writing research Proposals: Introduction-Method-Expected results and statistical treatment-References-Appendix-A sample research report.

PART - B

DOMAIN SPECIFIC SUBJECT

1. Forensic Science/ Medico-Legal Studies

Unit I: Introduction Fundamentals of Forensic Science

- Forensic Science: Definition, History & Development, Scope, Ethics in Forensic Science
- Physical Evidence: Nature, Types, Search methods, Collection, Preservation, Packing & Forwarding of Physical & Trace evidence for forensic analyses, Chain of Custody
- Crime Scene: Nature, Types, Preservation of Scene of Crime
- Criminal Investigations: Unnatural deaths, Criminal assaults, Sexual offences, Poisoning, Vehicular accidents
- Courts: Types, powers and jurisdiction, Admissibility of evidence in Courts, Definition of Experts, Court Procedures pertaining to Expert Testimony & Witness Forensic aspects of new laws: *Bharatiya Nagrik Suraksha Sanhita* (BNSS), *Bharatiya Sakshya Adhiniyam* (BSA), *Bharatiya Nyay Sanhita* (BNS).
- Organization of Forensic Science Laboratories of Centre and State, NCRB and NICFS, Police Organizations, Roles and Responsibilities
- Fundamental Rights: Right of Equality (Articles 14 to 18) and Right of Freedom (Articles 19 to 22) as per Constitution of India
- Criminal Profiling: Profile of victim and culprit, its role in crime investigation, Lie detection (Polygraphy), Narco-analysis, Brain mapping, scope and limitations

Unit II: Chemical Science

- Instrumental Techniques: Microscopy: Polarizing, Comparison, Stereoscopic, Fluorescent and Electron Microscopes
- Spectrophotometry: UV, Visible, IR, Raman, Atomic absorption, Emission, Neutron Activation Analysis,
- X – rays and x-ray-based techniques such as XRD, XRF
- Mass Spectroscopy based techniques HRLC-MS, HRGC-MS
- Chromatographic Techniques: TLC, GLC, HPLC, HPTLC, Ion Exchange Chromatography
- Hyphenated Techniques: GC-MS, LC-MS, IR-MS and ICP-MS
- Electrophoresis: High and Low voltage electrophoresis, Immunoelectrophoresis, Capillary Electrophoresis
- Immunoassays: Principle, Types, Techniques and applications (RIA, EMIT)
- Forensic Chemistry: Liquor analysis: Analysis of Ethyl alcohol in beverages, and illicit liquor, Analysis of Methanol and Denaturants, Analysis of Chemicals in Trap Cases
- NDPS: Narcotics Drugs and Psychotropic substances, Introduction and Classification of Control Substances, Precursor Chemicals, Forensic Examination of NDPS,

Mandatory Provisions of NDPS Act, Classification of NDPS Drugs, Drug Dependence and Drug Tolerance, Forensic examination of NDPS substances by various methods.

- Explosive Chemistry - Introduction, Classification and Chemistry of Explosives, Various Types of IEDs and their reconstruction, Mechanism of Explosion, Processing of Explosion Scene of Crimes –Forensic examination of high explosives by various methods
- Petroleum Chemistry- Physical Properties of Petroleum Products, Forensic examination of petroleum products as per BIS.
- Fire Chemistry- Chemistry and thermodynamics of fire, Forensic Investigation of Fire, Analysis of fire debris
- Forensic Toxicology: Introduction to Poisons, Classification of poisons, methods of administration of poisons, Mode of action of Poisons, Collection and Preservation of Biological evidence and circumstantial evidence in fatal and survival cases, & Extraction, Clean-up procedures, Identification of common poisons from viscera, tissues and body fluids (Drugs, Insecticides & Pesticides, Plant poisons, Metallic Poison)
- Basic principles of pharmacology, pharmacokinetic and pharmacodynamic
- Quality Management: Overview of ISO 9001 & ISO 17025:2017 requirements. Quality Control, Quality Assurance and Total Quality Management. Reference Standards & Certified Reference Material, Traceability, validation of the new methods and verification measurement of uncertainty, maintenance and calibration of instruments. Proficiency testing, Quality Audit, Management Review Meeting, Importance of Accreditation of Forensic Science Laboratories.

Unit III: Biological Science

- Serology and Immunology: Blood Group Systems, Determination of Species of Origin, tools and techniques for blood, physiology and biochemical properties of various body fluids (semen, saliva, menstrual blood, urine). Presumptive and confirmatory tests for body fluids, modern techniques for qualitative and quantitative analysis of body fluids, proteomics for body fluids identification, cell and organs of the immune system, type and properties of antibodies,
- DNA Forensics: Structure and functions of nucleic acids, Various DNA Extraction techniques – organic extraction, silica based and magnetic based techniques and kits, Various DNA quantification techniques – UV-Visible Spectroscopy based, Real Time PCR, Fluorometry. Polymerase Chain Reaction (PCR) and its variants for forensic applications, DNA markers for human identification – STRs, Y-STRs, X-STRs, D-loop, SNPs, Various commercial kits for STR (autosomal, Y- and X-) Profiling, Automated DNA Sequencing by Sanger Method, Next Generation Sequencing Technologies (Ion Torrent, Illumina MiSeq, Oxford Nanopore etc.) and its applications in DNA Forensics for paternity, identification, ancestry and phenotyping. Basic Principles of population genetics, allele frequency and genotype frequency, calculations for Random Match Probability (RMP) and Likelihood Ratio (LR) for

matching statistics and paternity testing, non-human identification through DNA barcoding and related markers

- Forensic Anthropology and Medico-Legal Analysis: Modes & Manner of deaths, Sexual offences and its medicolegal importance, Amendments in law related to sexual offences, Postmortem examination and Postmortem changes, Estimation of time since death, Injuries & Wounds: Types, Medicolegal importance, Gunshot wounds, Determination of Species of Origin, Sex , Age, Stature, and individual identification through skeletal remains, Identification through Skull superimposition and facial reconstruction, Human dentition, Type of teeth, determination of Age, Bite marks
- Forensic Entomology: Introduction, Insects of forensic importance, Insects on Carrion, Forensic applications,
- Forensic Biology: Pollens and Diatoms, Wildlife forensics - Wildlife Acts, evidence and identification methods

Unit IV: Physical Science

- Firearms: Types, Classification, Ammunition and their Compositions Forensic examination of Firearms, Ammunition, Firearms' projectiles (Bullets, Shots, Slug etc.), Shell case Gunshot residues analysis Identification of Origin, Range of Fire, Basics of Internal, External and Terminal Ballistics, Instrumental Analysis
- Basic concepts of physical evidence: Evidence and its type, Glass, Tyre Marks, Bite Marks, Footprints, Soil, Fiber, Paint, Lip Print, Ear Prints, Tool Marks, Cement and Concrete examination. Forensic significance, collection, packaging and forensic examination.
- Photography: Types, application in criminal investigation & Forensic evidence examination. Reproduction of documents through photographic and mechanical means and their examination
- Biometric Systems of Identification: Introduction to Biometrics, Types of Biometrics, Biometric applications, Palm prints, Gait pattern, Iris scan, Retinal scan, Voice prints, keystroke analysis, etc.
- Fingerprints: History, Characteristics, Types, Classification, Collection, Preservation, Development, Lifting and Comparison, Examination of Chance Prints, Computerization of Fingerprints, AFIS
- Documents: Definition, Types, Preliminary examination of documents, basics of handwriting and signature examination, types of forgeries and their detection, examination of Alterations in the document, Indentations, Secret writings and Charred documents, estimating the age of Inks and Papers, examination of typescripts, printed documents, computer printouts, scanned documents, seal and stamp impressions.

Unit V: Digital, Cyber and Multimedia Forensics

- Basic components of a computer: input devices, output devices., storage devices, the central processing unit (CPU), binary, octal, decimal, and hexadecimal number system,

their conversions and operations, representation of information in binary and hexadecimal formats

- Understanding the role of an operating system (OS), the booting process, introduction to process and memory management, Windows OS architecture.
- Fundamentals of computer networks, the protocols and functions of each layer, types of network connections, and various networking devices.
- Introduction to multimedia evidence, handling, collection and preservation of audio/video/image evidence, speaker profiling, audio authentication and enhancement techniques, Video and Image enhancement, authentication and facial comparison.
- Device source identification, metadata analysis, detection of deepfake audio, video or Image and compression artifacts. File structure analysis, steganography, and watermark detection.
- Concepts of artificial intelligence: search algorithms, knowledge representation, and reasoning, supervised, unsupervised, and reinforcement learning, decision trees, SVMs, k-means, and ensemble methods.
- Basic concepts of neural networks, CNNs, RNNs, GANs, and transformers, along with training strategies, optimization techniques, and regularization. Basics of computer vision, natural language processing, and ethical issues of AI in real-world applications.
- Latest tools and techniques used in Digital Forensics and Multimedia Forensics

PART - B

DOMAIN SPECIFIC SUBJECT

2. Cyber Security and Digital Forensics

Unit I:

- Computer Fundamentals
- Computer Organization and Architecture
- Operating System and File System
- Computer Networks and Internet (wired and wireless)
- OSI Reference Model
- TCP/IP Protocol Suite

Unit II:

- Programming Languages (C, C++, Java, .Net, Python)
- Object Oriented Concepts
- Data Structure,
- Software Engineering Concepts

Unit III:

- Emerging fields (AI, Metaverse, Cloud and others)
- Big Data Analysis
- Fundamental of Internet of Things
- Blockchain and Cryptocurrencies
- Applications of Computer

Unit IV:

- Basics of Cyber Security
- Vulnerability Assessment and Penetration Testing
- Malware Analysis and Reverse Engineering
- Information Security (Application, Database, Hardware, Network, Mobile and Web)
- Compliance and Audit
- Cryptography and Steganography

Unit V:

- Types of Cyber Crimes
- Cyber Crime Investigation Tools and Techniques
- Cyber Crime Scene Management and Electronic Evidences
- Digital Forensics Process and Lifecycle
- Branches of Digital Forensics (Computer, Mobile, Network, Cloud, IoT, and others)
- Digital Forensics Tools and Technologies
- Indian IT Act 200 (its amendments) and other relevant laws

PART - B

DOMAIN SPECIFIC SUBJECT

3. Behavioural Forensics (Forensic Psychology/ Criminology/ Clinical Psychology)

Unit-I:

- Psychological thought in some major Eastern Systems: Bhagavad Gita, Buddhism, Sufism and Integral Yoga. Academic psychology in India: Pre- independence era; post-independence era; 1970s: The move to addressing social issues; 1980s: Indigenization; 1990s: Paradigmatic concerns, disciplinary identity crisis; 2000s: Emergence of Indian psychology in academia. Issues: The colonial encounter; Post colonialism and psychology; Lack of distinct disciplinary identity.
- Western: Greek heritage, medieval period and modern period. Structuralism, Functionalism, Psychoanalytical, Gestalt, Behaviorism, Humanistic- Existential, Transpersonal, Cognitive revolution, Multiculturalism. Four founding paths of academic psychology - Wundt, Freud, James, Dilthey. Issues: Crisis in psychology due to strict adherence to experimental- analytical paradigm (logical empiricism). Indic influences on modern psychology.
- Essential aspects of knowledge paradigms: Ontology, epistemology, and methodology. Paradigms of Western Psychology: Positivism, Post-Positivism, Critical perspective, Social Constructionism, Existential Phenomenology, and Co-operative Enquiry. Paradigmatic Controversies. Significant Indian paradigms on psychological knowledge: Yoga, Bhagavad Gita, Buddhism, Sufism, and Integral Yoga. Science and spirituality (avidya and vidya). The primacy of self-knowledge in Indian psychology

Unit-II:

- Nature, scope and history of social psychology
- Traditional theoretical perspectives: Field theory, Cognitive Dissonance, Sociobiology, Psychodynamic Approaches, Social Cognition.
- Social perception [Communication, Attributions]; attitude and its change within cultural context; prosocial behavior
- Group and Social influence [Social Facilitation; Social loafing]; Social influence [Conformity, Peer Pressure, Persuasion, Compliance, Obedience, Social Power, Reactance]. Aggression. Group dynamics, leadership style and effectiveness. Theories of intergroup relations [Minimal Group Experiment and Social Identity Theory, Relative Deprivation Theory, Realistic Conflict Theory, Balance Theories, Equity Theory, Social Exchange Theory]
- Applied social psychology: Health, Environment and Law; Personal space, crowding, and territoriality.

Unit-III:

- Sensory systems: General and specific sensations, receptors and processes
- Neurons: Structure, functions, types, neural impulse, synaptic transmission. Neurotransmitters.
- The Central and Peripheral Nervous Systems – Structure and functions. Neuroplasticity.
- Methods of Physiological Psychology: Invasive methods – Anatomical methods, degeneration techniques, lesion techniques, chemical methods, microelectrode studies. Non-invasive methods – EEG, Scanning methods.
- Muscular and Glandular system: Types and functions Biological basis of Motivation: Hunger, Thirst, Sleep and Sex.
- Biological basis of emotion: The Limbic system, Hormonal regulation of behavior.

Unit-VI:

- Attention, Perception, Learning, Memory and Forgetting Attention: Forms of attention, Models of attention Perception:
- Approaches to the Study of Perception: Gestalt and physiological approaches Perceptual Organization: Gestalt, Figure and Ground, Law of Organization Perceptual Constancy: Size, Shape, and Color; Illusions
- Perception of Form, Depth and Movement Role of motivation and learning in perception
- Signal detection theory: Assumptions and applications, Subliminal perception and related factors, information processing approach to perception, culture and perception, perceptual styles, Pattern recognition, Ecological perspective on perception.
- Learning Process: Fundamental theories: Thorndike, Guthrie, Hull
- Classical Conditioning: Procedure, phenomena and related issues Instrumental learning: Phenomena, Paradigms and theoretical issues; Reinforcement: Basic variables and schedules; Behaviour modification and its applications
- Cognitive approaches in learning: Latent learning, observational learning. Verbal learning and Discrimination learning
- Recent trends in learning: Neurophysiology of learning
- Memory and Forgetting
- Memory processes: Encoding, Storage, Retrieval
- Stages of memory: Sensory memory, Short-term memory (Working memory), Long-term Memory (Declarative – Episodic and Semantic; Procedural)
- Theories of Forgetting: Interference, Retrieval Failure, Decay, Motivated forgetting

Unit-V:

- Schools of Criminology: Demonology, Classical, Neo-Classical Schools, Positivist / Positive School, Cartographic School, Biological and Constitutional School - Body Types, Hereditary Traits, Endocrine Glands; Economic Theories of Crime; Multiple Factors. Psycho-Analytical Theories and Psychopathic Personality.
- Social Strain Theories: Anomie theory, Culture conflict and Sub culture theory.

- Social Ecology Theories: Concentric Zone theory, Environmental Criminology, Social disorganization theory, Lower class culture theory. Social Learning Theories: Theory of Imitation, Differential Association Theory, Differential Identification theory, and Differential opportunity theory.
- Social Control Theories: Drift and Neutralization theory, Containment theory, Social bond theory.
- Social Conflict Theories: Labelling Theory, Radical Criminology, Conflict Criminology, Critical Criminology, Realist Criminology.
- Modern Theories: Routine Activities theory, Rational Choice theory, Shaming theory, Broken windows theory, Feminist Criminology, Masculinity theory, Life Course theory, Integrated theories, Space Transition theory.
- Contemporary Perspectives: Cultural Criminology, News making Criminology, Peacemaking Criminology, Green Criminology, Visual Criminology, Cyber Criminology, Positive Criminology, Translational Criminology

PART - B

DOMAIN SPECIFIC SUBJECT

4. Engineering And Technology (Nanotechnology & Food Technology)

Unit-I: Basic Sciences (including Forensic Science)

- Atomic Structure and Bohr Model, Molecular Structure and Chemical Bonding, Covalent bond, ionic bond and metallic bonds, Periodic properties of elements,
- Concepts of acids and bases, Chemical thermodynamics, Chemical kinetics, Electrochemistry, Solid state chemistry,
- Basics of Life sciences, structure and function of Cell, Gene as the basic unit of heredity, The evolution theory,
- Historical development of Forensic Science, Principles of Forensic Science, Forensic Science Laboratories and institutions in India, Organizational structure of forensic science laboratory, Criminal justice system in India, Definition and classification of crime

Unit-II: Instrumental Techniques

- Electro Magnetic Radiation and their properties, Working principles of various spectroscopic techniques
- The optical absorption and emission spectroscopy of atoms and molecules, Vibrational spectroscopy, Nuclear Magnetic Resonance Spectroscopy, Electron Spin Resonance Spectroscopy
- X-Ray Photoelectron Spectroscopy and Auger electron spectroscopy, X-ray diffraction by crystal planes,
- The instrumental techniques of all the above spectroscopic techniques (UV-Vis, PL, FT-IR, Raman, XPS, XRD, NMR, ESR) and data interpretation,
- Working principles and classification of Chromatography, Various chromatographic techniques (HPLC, GC, GC-MS, GPC, HPTLC, SFC) with their instrumental details, data collection and interpretation
- Mass spectrometry, Types of Mass spectrometers, Mass fragmentation, Instrumentation details of various mass spectrometers.
- Optical Microscopes, Types of optical microscopes, advantages and limitations of light microscopes. Basic principle of potentiometric techniques and cyclic voltammetry.

Unit-III: Nanotechnology

- Historical perspective of Nanotechnology
- Classifications of Nanomaterials: 2D, 1D and 0D systems, Synthesis and properties of semiconductor nanoparticles (QDs),

- Synthesis and properties of metal and metal oxide nanoparticles, the concept of Top Down and Bottom-Up approach, Colloids, Nanomaterial Synthesis, CVD (Chemical Vapor Deposition)/MOCVD technique, Lithographic Techniques,
- Carbon Nanostructures (CNT, Fullerene, Graphene, Sumanene), Sensors and Transducers, Definition and Classification of Nanosensors, Fuel Cell, Solar Cell,
- Introduction to Composite Materials, Reinforcements/Fibers, Self-Assembled nanostructures (micelles, liposome, niosome)
- Electron Microscopic techniques (SEM, TEM, AFM)

Unit-VI: Food Technology

- Food Chemistry: Water, Carbohydrates, Proteins, Lipids, Enzymes, Vitamins, Minerals, Pigments, Flavors, Additives and Contaminants, Food fortification.
- Food Microbiology: Microbial growth patterns, Factors affecting microbial growth, Sources of microorganisms in food, Roles of beneficial microbes in food processing, Changes caused by microorganisms during spoilage (degradation of carbohydrates, fats, proteins and other constituents), Water activity, Foodborne infections and intoxications, Control of microbial growth in food, Thermo-bacteriology, Bio-preservations and Food fermentations.
- Food Preservation and Packaging: Food biodeterioration, Factors affecting product quality and shelf-life, Principles and methods of food preservation, Thermal and non-thermal techniques, hurdle technology, food packaging functions, Vacuum packaging, Active packaging, intelligent packaging, Modified atmospheric packaging migration from packaging from packaging material to food.
- Food Safety and Quality Assurance: Food safety hazards, Adulterants, Contaminants, Allergens, FSSAI, HACCP, GMP, GAP, ISO 22000, GLP, ISO0 17025, NABL.

PART - B

DOMAIN SPECIFIC SUBJECT

5. Engineering And Technology (Structural/Civil Engineering)

Unit-I: Mechanics of Solids

- Equilibrium of particle and rigid body, center of gravity and moment of inertia, friction, mechanical properties of engineering materials, testing methods, stress-strain diagrams, shear and bending stresses.

Unit-II: Concrete Technology

- Constituents of concrete, mix design, properties of constituents of concrete, properties of fresh and hardened concrete, concreting techniques, various types of concrete, special concrete, ready mixed concrete, self-compacting concrete

Unit-III: Analysis of Structures

- Determinate and indeterminate structures, classical and matrix methods of structural analysis, axial deformation of bars, analysis of framed structures, applications of finite element, dynamic analysis

Unit-IV: Design of Structures

- Reinforced Concrete Structures: Design of reinforced concrete elements, analysis and design of buildings, design of water tanks, retaining walls, flat slab; ductile detailing; Wind effects on structures; prestressed concrete, design of flexural members, design of tension and compression members, losses due to prestress
- Steel Structures: Design of members, design of bolted and welded connections, analysis and design of industrial buildings, plastic analysis of structures, design of light gauge steel structures

Unit-V: Earthquake Engineering, Soil Mechanics & Evaluation, Repair and Rehabilitation of Structures

- Earthquake Engineering: Dynamics of Structures -Free and forced vibration of single and multi- degree of freedom systems; modes of vibration, Rayleigh-Ritz method, Earthquake ground motion, engineering seismology, characteristics of earthquakes, effects of earthquake on structures, response spectra, evaluation of earthquake forces, earthquake resistant design of masonry and R.C. structures, capacity-based design and detailing.
- Soil Mechanics: Soil properties and strength behavior, subsurface investigation; Foundation Engineering-shallow and deep foundations, earth and earth retaining structures.

- Different forms of cracks, factors responsible for deterioration of concrete, defects in steel, masonry and concrete structures, evaluation of structures, Nondestructive testing, repair techniques, strengthening of structural elements, structural health monitoring

PART - B

DOMAIN SPECIFIC SUBJECT

6. Law

Unit-I:

Jurisprudence

- Nature and sources of law
- Schools of Jurisprudence
- Law and morality
- Concept of rights and duties
- Legal personality
- Concepts of property, ownership and possession
- Concept of liability
- Law, poverty and development
- Global justice
- Modernism and post-modernism

Constitutional and administrative law

- Preamble, fundamental rights and duties, directive principles of state policy.
- Union and State executive and their interrelationship
- Union and State legislature and distribution of legislative powers
- Judiciary
- Emergency provisions
- Temporary, transitional and special provisions in respect of certain states
- Election Commission of India
- Nature, scope and importance of administrative law
- Principle of natural justice
- Judicial review of administrative actions – Grounds.

Unit-II:

Public International Law And IHL

- International law – Definition, nature and basis
- Sources of International law
- Recognition of states and governments
- Nationality, immigrants, refugees and internally displaced persons (IDPs)
- Extradition and asylum
- United Nations and its organs
- Settlement of international disputes
- World Trade Organization (WTO)
- International humanitarian law (IHL) - Conventions and protocols
- Implementation of IHL - Challenges

Law of crimes

- General principles of criminal liability – *Actus reus* and *mens rea*, individual and group liability and constructive liability
- Stages of crime and inchoate crimes - Abetment, criminal conspiracy and attempt
- General exceptions
- Offences against human body
- Offences against state and terrorism

- Offences against property
- Offences against women and children
- Drug trafficking and counterfeiting
- Offences against public tranquility
- Theories and kinds of punishments, compensation to the victims of crime

Unit-III:

Law of Torts and Consumer Protection

- Nature and definition of tort
- General principles of tortious liability
- General defenses
- Specific torts – Negligence, nuisance, trespass and defamation
- Remoteness of damages
- Strict and absolute liability
- Tortious liability of the State
- The Consumer Protection Act 1986 - Definitions, consumer rights and redressal mechanism
- The Motor Vehicles Act, 1988 - No fault liability, third party insurance and claims tribunal
- The Competition Act, 2002 - Prohibition of certain agreements, abuse of dominant position and regulation of combinations

Commercial law

- Essential elements of contract and e-contract
- Breach of contract, frustration of contract, void and voidable agreements
- Standard form of contract and quasi-contract
- Specific contracts - Bailment, pledge, indemnity, guarantee and agency
- Sale of Goods Act, 1930
- Partnership and limited liability partnership
- Negotiable Instruments Act, 1881
- Company law – Incorporation of a company, prospectus, shares and debentures
- Company law – Directors and meetings
- Corporate social responsibility

Unit-IV

Family law

- Sources and schools
- Marriage and dissolution of marriage
- Matrimonial remedies - Divorce and theories of divorce
- Changing dimensions of institution of marriage – *Live-in* relationship
- Recognition of foreign decrees in India on marriage and divorce
- Maintenance, dower and *Stridhan*
- Adoption, guardianship and acknowledgement
- Succession and inheritance
- Will, gift and *wakf*, Uniform Civil Code

Environment and human rights law

- Meaning and concept of 'environment' and 'environmental pollution'
- International environmental law and UN Conferences
- Constitutional and legal framework for protection of environment in India
- Environmental Impact Assessment and control of hazardous waste in India
- National Green Tribunal
- Concept and development of human rights
- Universalism and cultural relativism
- International Bill of Rights
- Group rights – Women, children, persons with disabilities, elderly persons, minorities and weaker sections
- Protection and enforcement of human rights in India – National Human Rights Commission, National Commission for Minorities, National Commission for Women, National Commission for Scheduled Castes, National Commission for Schedule Tribes and National Commission for Backward Classes

Unit-V:

Intellectual property rights and information technology law

- Concept and meaning of intellectual property
- Theories of intellectual property
- International conventions pertaining to intellectual properties
- Copyright and neighboring rights – Subject matters, limitations and exceptions, infringement and remedies
- Law of patent – Patentability, procedure for grant of patent, limitations and exceptions, infringement and remedies
- Law of trademark – Registration of trademarks, kinds of trademarks, infringement and passing off, remedies
- Protection of Geographical Indications
- Bio-diversity and Traditional Knowledge
- Information technology law- digital signature and electronic signature, electronic governance, electronic records and duties of subscribers
- Cyber crimes, penalties and adjudication

Comparative public law and systems of governance

- Comparative Law – Relevance, methodology, problems and concerns in Comparison
- Forms of governments – Presidential and parliamentary, unitary and federal
- Models of federalism – USA, Canada and India
- Rule of Law – 'Formal' and 'substantive' versions
- Separation of powers – India, UK, USA and France
- Independence of judiciary, judicial activism and accountability – India, UK and USA
- Systems of constitutional review – India, USA, Switzerland and France
- Amendment of the Constitution – India, USA and South Africa
- *Ombudsman* –Sweden, UK and India
- Open Government and Right to Information - USA, UK and India

PART - B

DOMAIN SPECIFIC SUBJECT

7. Management

Unit-I:

- Management – Process, Theories, and Approaches, Managerial Roles and Skills, Planning, Organizing, Staffing, Coordination and Controlling.
- Managerial Economics – Concept and Importance, Demand Analysis, Elasticity, Market Structure, Market Classification, Price Determination and National Income.
- Organizational behavior – Significance and theories, Individual behavior – Perception, Personality, Learning, Motivation, Leadership, Decision making – Concepts and Types.
- Group Dynamics, Organization Structure and Design, Organizational Culture, Change, Conflict, Power and Politics.
- Strategic management- Concepts and Process, Strategic Analysis, SWOT Analysis, BCG Matrix, PESTAL Analysis, Porters Five Forces, McKinsey's 7S Framework.

Unit-II:

- Accounting Principles and Standards. Preparation of Financial Statements, Financial Statement analysis, Ratio Analysis, Fund Flow Analysis, Cash Flow Analysis and DuPont Analysis.
- Financial Management – Nature, Objective, Scope, Value and Returns, Time Value of Money, Valuation of Bonds and Shares, Risk and Uncertainty Analysis.
- Capital Structure-Theories, Cost of Capital, Sources and Finance, Budgeting and Budgetary Control, Types and Process, Zero-base Budgeting.
- Leverages – Operating, Financial and Combined Leverages, EBIT – EPS Analysis, Financial Break Even Point and Indifference Level.
- Portfolio Management CAPM, APT, Derivative Options, Option Payoffs, Option Pricing, Forward Contracts and Future Contracts. Working Capital Management – Determinants, Cash, Inventory Receivables and Payables Management.

Unit-III:

- Fundamentals of Marketing - Marketing Concept, Orientation, Trends, Customer Value and Satisfaction, Marketing Philosophy, Marketing Mix, Strategic Marketing Planning.
- Market Segmentation, Targeting and Positioning – Bases for Segmentation, Marketing Targeting Strategies, Positioning Strategies. Differentiation and Value Proposition.
- Consumer and Industrial Buying Behavior – Theories and Models, Consumer Decision Making Process. Factors influencing Consumer Behavior and Organizational Buying behavior.

- Product – New Product Development and Product Life Cycle, Brand Management - Brand Equity, Developing Brand Strategy and Labeling. Pricing - Pricing Objectives, Strategies and Methods.
- Promotion and Distribution Strategies. Integrated Marketing communications – Advertising, Sales Promotion, Public Relations, Personal Selling, Digital Marketing. Distribution Channels and Logistics Management, Retailing, wholesaling and E - Commerce strategies.

Unit-IV:

- Human Resource Management - nature, scope and evolution of HRM, Objectives and functions of HRM, HR policies and Practices, Strategic HRM.
- Human Resource Planning and Acquisition, Job Analysis and Job Design, Recruitment and Selection, Talent Acquisition.
- Training and Development – learning theories and training and development methods, Performance Management – performance appraisals and feedback mechanisms, Career Planning.
- Compensation – Job evaluation, Wage and Salary Administration, Incentives and benefits. Employee Welfare, Health and Safety.
- Industrial relations and Labour laws – Trade Unions, Collective Bargaining, Grievance Handling, Key Labour Laws, Industrial dispute and Resolution Mechanisms.

Unit-V:

- Introduction to Production and Operations Management – Nature and importance, Types of Production Systems, Role of Operations in Strategic Management.
- Product and Process design – Product selection and Capacity Planning, Facility Layout and Location Planning.
- Production Planning and Control – Aggregate Planning, Master Production Schedule, Material Requirement Planning, Just-in-Time scheduling, Dispatching and Inventory Management.
- Quality management – TQM, Six Sigma, Kaizen, Statistical quality control (SQC tools), ISO Standards and Quality Certifications
- Supply Chain and Logistics Management – Design and Coordination, Inventory Control Models, Logistics Management, Vendor Management and Outsourcing Strategies.

PART - B

DOMAIN SPECIFIC SUBJECT

8. Police Science and Security Studies (Homeland Security)

Unit-I: Homeland Security and Modern Security Technologies

- Homeland Security: Origin & Evolution, Principles, Mission, Scope and Domains
- National Security Doctrine, National Security Strategy, Framework of Homeland Security in the U.S., Framework of National Security in India; National Security Council
- Technology in Homeland Security: Physical Security Technologies - Access Control Systems, Security Sensors & Alarm systems, Fire prevention & response, Protective Equipment
- Screening and Scanning technologies: UVSS, Backscatter, Computed tomography, Surveillance Technologies - Cameras, Video Management, Analytics, VSaaS, Wireless technologies, Authentication Technologies - Biometrics and Behavioral biometrics, Smart card systems and its types
- Technology for National Security: Arms & Weapons, Combat & Patrol Vehicles, Satellites, Cyber Security, Cyber Warfare, Electronic warfare & counter-electronic warfare. Unmanned Aerial Vehicles: Drones & Anti-Drone Technologies, Drone Applications & Regulations, Radars

Unit-II: India's Geopolitics, Border and Maritime Security

- India's neighbourhood: South & East Asia
- India and its relations with Major Powers: U.S., Russia, China, Japan, Israel and UK
- India at International Institutions - World Bank, IMF, WTO, BRICS, G-20, UN, EU, OPEC, QUAD
- Overview of India's Border Security: Land Warfare, Border Conflicts, Types of Borders, Border Barriers, India's Borders and strategic significance
- Role of Border Guarding Forces, Border Management Department; Border Security technologies and practices, Integrated Check Posts (ICPs); Land Customs Stations (LCS)
- Maritime History, Security and conflicts, Maritime Environment and Legal Dimensions, Maritime Zones Act of 1976; United Nations Convention on the Law of the Sea (UNCLOS), 1982 & Conflicts
- India's Maritime Outlook: India's Maritime Strategy & Security Initiatives
- India's Maritime search and rescue region, Flight information regions, Air Defence Identification Zone (ADIZ)

Unit-III: Fundamentals of Policing & Criminal Justice System

- Overview of Policing in India: Functions, History & Evolution of Modern Policing, Indian Police Act, 1861, Police Reforms, and Community Policing
- Role of Ministry of Home Affairs (MHA), Organization and structure of Police and the Indian Police Service
- State Police Organization: State level, Range level, Commissionerate System, District level, Sub-division/Circle level, Police Station level; Executive powers and duties of Police Officers
- Criminal Laws: Bharatiya Nyaya Sanhita, Bharatiya Nagarik Suraksha Sanhita, Bharatiya Sakshya Adhiniyam
- Crime Investigation: First Information Report, Charge sheet, Case diary, Statement of witness, Confession of accused, Memo of Evidence and Final report as per BNSS.
- Judiciary: Structure, Hierarchy and Jurisdiction, Role in Maintenance of Law and Order, Judicial Review, Landmark Judgments on Criminal Justice System, and Alternative Dispute Resolution (ADR): Arbitration, Mediation and Counselling
- Central Police Organizations, Central Armed Police Forces of India
- Correctional Administration: Institutions, Theories of Punishment, Probation, Parole & After Care and Juvenile Justice

Unit-IV: Disaster Management, Risk Assessment, and Critical Infrastructure Protection

- Disaster Management: Indian Geography and Weather systems, Disaster Types, Evolution in India, Authorities, Institutions, Agencies and Response forces
- Relief, Rescue & Rehabilitation Management, Community Based Disaster Management and Preparedness Planning (CBDP), Disaster Management Technologies – Remote Sensing, GIS, Seismology and Meteorology
- Risk Management Framework: ISO 31000, Risk assessment, Benefit-Cost ratio, and Critical Thinking in Risk Management
- Threat Identification & Assessment: Information Gathering Techniques, Hazard and Operability Study (HAZOP); Vulnerability Assessment: Structured What If Technique (SWIFT); Impact Assessment: Failure Mode and Effects analysis (FMEA); Probabilistic Risk Assessment (PRA), SWOT Analysis, CARVER Matrix
- Critical Infrastructure Protection – Domains, Criticality, Interdependency and Challenges; Emergency Management, Incident Command & Control System, Risk Informed & Resilience Informed Decision Making; Critical Information Infrastructure Protection
- Security Plan & Design, Crime Prevention Through Environmental Design (CPTED), Disaster Recovery & Business Continuity, Post-Incident Operations, Event analysis
- Legal Provisions: Private Security Agencies (Regulation) Act, 2005 and model rules

Unit-V: Internal Security, Intelligence and Counterintelligence

- Internal Security: Meaning, Dimensions, Framework, Significance, and Challenges
- Threats to Internal Security: Terrorism, Insurgency, Militancy, Radicalization, and Responses

- Intelligence: Definition, Characteristics, Intelligence Analysis Process, Intelligence Collection Methods, structure & functions
- Intelligence Sharing initiatives: MAC, NATGRID, CCTNS, ICJS; Agencies – R&AW, IB, DIA, NIA; Issues of Parliamentary oversight on Indian intelligence agencies
- International Intelligence Organizations – CIA, MI6, Mossad; Multi-national intelligence sharing alliances and Laws governing intelligence sharing and related issues
- Women in Intelligence and Business Intelligence; Tactical Use of Intelligence: Terrorism, Refugee Crisis, Naxalism, and Organized Crime
- Counterintelligence: Counter Surveillance – Technical & Manual; Agent Operations, Counterintelligence Protection, Counter Denial and Counter Deception

PART - B

DOMAIN SPECIFIC SUBJECT

9. Pharmacy

Unit I:

- General Chemistry, Principles of Analytical Chemistry, Theoretical and Practical aspects of Analytical Chemistry,
- General principles of organic chemistry, Pericyclic reactions, Aromaticity & chemistry of aromatic compounds, Different classes of compounds, Amino acids & proteins,
- Different aromatic classes of compounds, Polycyclic aromatic hydrocarbons, Stereochemistry, Carbohydrates, Carbonyl Chemistry, Heterocyclic Chemistry, Protection & deprotection of groups, Bridged rings,
- Kinetic & thermodynamic control, Name Reactions. Chemical thermodynamics, Statistical thermodynamics, Electrochemistry, Chemical kinetics, enzyme kinetics,
- Chemistry in nanoscience and technology, Catalysis and green chemistry, Medicinal chemistry, Supramolecular chemistry, Environmental chemistry, QSAR, Impurities and their analysis.

Unit II:

- Narcotic Drugs and Psychotropic Substances Act, and Rules thereunder, Introduction to Intellectual Property Rights and Indian Patent Act 1970,
- The Pharmacy Act 1948, Drugs and Cosmetics Act 1940, Rules 1945, including New Drug applications.
- General Pharmacology, Pharmacology of peripheral nervous system, central nervous System and cardiovascular system, Principles of toxicology,
- Therapeutic drug monitoring, adverse drug reaction (ADR), types of ADR, Mechanism of ADR. Drug interaction, Monitoring and reporting of ADR and its significance,
- Drug therapy in gastrointestinal, hepatic, renal, cardiovascular and Respiratory Disorders, Pharmacovigilance, Therapeutic drug monitoring, Nutraceuticals, essential drugs and rational drug usage

Unit III:

- Importance of quality control in pharmacy, Acid-base titrations, Extraction techniques, Potentiometry, Calibration
- General principles of spectroscopy, Mass spectrometry, Nephelometry & Turbidimetry, Ultraviolet-visible Spectrometry, Spectrofluorimetry, Flame photometry & atomic absorption spectrometry, Infrared spectrometry,
- Non-aqueous titrations, Oxidation-reduction titrations, Precipitation titrations, Complexometric titrations, Proton nuclear magnetic resonance spectrometry,
- Chromatography and hyphenated techniques

Unit IV:

- Pharmaceutical Plant, location, layout, Ophthalmic preparations, Preformulation,
- Packaging Materials, Cosmetics, Pilot plant scale-up techniques, Dosage Form Necessities and Additives, Powders, Tablets, Parenteral - product requiring sterile packaging,
- Suspensions, Emulsions, Suppositories, Stability of formulated products, Prolonged Action Pharmaceuticals, Novel Drug delivery system, GMP and Validation,
- Semisolids, Allopathic dosage form, Crude extract, Allergenic extract, Capsules, Liquids (solutions, syrups, elixirs, spirits, aromatic water, liquid for external uses), Pharmaceutical Aerosols.

Unit V:

- Forensic Science: Definition, History & Development, Scope, Ethics in Forensic Science
- Physical Evidence: Nature, Types, Search methods, Collection, Preservation, Packing & Forwarding of Physical & Trace evidence for forensic analyses, Chain of Custody,
- Crime Scene: Nature, Types, Preservation of Scene of Crime, Criminal Investigations: Unnatural deaths, Criminal assaults, Sexual offences, Poisoning, Vehicular accidents.

PART - B

DOMAIN SPECIFIC SUBJECT

10. Environmental Sciences

Unit-I: Fundamentals of Environmental Science and Ecology

- Definition, Principles and Scope of Environmental Science.
- Fundamentals of Environmental Science, Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere.
- Meteorological parameters - pressure, temperature, precipitation, humidity, mixing ratio, saturation mixing ratio, radiation and wind velocity, adiabatic lapse rate, environmental lapse rate, Wind roses.
- Biogeographic provinces of the world and agro-climatic zones of India.
- Concept of sustainable development.
- Fundamentals of Environmental Biology, Ecology and Biodiversity Conservation.
- Fundamental of Environmental Chemistry, Environmental Pollution (air, water, soil, solid waste/hazardous/other types of wastes), it's monitoring and control, Environmental Legislation, Impact Assessment, Environmental Management, Contemporary Environmental Issues.
- Ecology as an inter-disciplinary science.
- Origin of life and speciation.
- Ecosystem Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, energy flow models, food chains and food webs.
- Biogeochemical cycles, Ecological succession. Species diversity, Concept of ecotone, edge effects, ecological habitats and niche. Ecosystem stability and factors affecting stability.
- Ecosystem services. Basis of Ecosystem classification. Types of Ecosystem. Biomes: Concept, classification and distribution. Characteristics of different biomes. Population ecology, Community ecology.
- Biodiversity and its conservation: Definition, types, importance of biodiversity and threats to biodiversity.
- National parks, Sanctuaries, Protected areas and Sacred groves in India. Concepts of gene pool, biopiracy and bio-prospecting. Concept of restoration ecology.
- Extinct, Rare, Endangered and Threatened flora and fauna of India.
- Concept of Industrial Ecology, Toxicology and Microbiology: Absorption, distribution and excretion of toxic agents, acute and chronic toxicity, concept of bioassay, threshold limit value, margin of safety, therapeutic index, biotransformation. Major water borne diseases and air borne microbes.
- Environmental Biotechnology: Bioremediation – definition, types and role of plants and microbes for in situ and ex situ remediation. Bio indicators, Bio fertilizers, Biofuels and Biosensors.

Unit-II: Environmental Chemistry and Environmental Monitoring

- Classification of elements, Stoichiometry, chemical potential, chemical kinetics, chemical equilibria, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, radioisotopes.
- Composition of air. Chemical speciation.
- Chemical processes in the formation of inorganic and organic particulate matters, photochemical reactions in the atmosphere, Oxygen and Ozone chemistry.
- Photochemical smog. Water and solubalization Concept of DO, BOD and COD.
- Sedimentation, coagulation, flocculation, filtration, pH and Redox potential. Soil chemistry, Soil humus, Soil texture, soil atmosphere, water present in soil, soil solution, cation exchange capacity, anion exchange capacity, base saturation, soil pH, acidity, basicity, and affecting factors, leaching and erosion.
- Salt affected soils- saline soil, sodic soil, saline-sodic soil.
- Soil as source of plant nutrient, trace elements in soils. Biogeochemical cycles – nitrogen, carbon, phosphorus and sulphur.
- Pesticides and their classification and effects.
- Biochemical aspects of heavy metals (Hg, Cd, Pb, Cr) and metalloids (As, Se). CO, O_3, PAN, VOC and POP.
- Carcinogens in the air.
- Sampling and analysis of water/wastewater – Introduction, sampling procedures, onsite/offsite parameters, preservation of water samples.
- Analysis of samples of water/effluents, determination of organoleptic parameters, solids, Dissolved oxygen, organic pollution estimation of biochemical oxygen demand (BOD), estimation of chemical oxygen demand (COD), estimation of chloride (Mohr's method), estimation of Sulphate (turbidimetric method).
- Air pollution sampling and measurement, types of pollutant sampling and measurement, Ambient air sampling, collection of gaseous air pollutants, collection of particulate pollutants, stack sampling, analysis of air pollutants-sulfur dioxide- nitrogen dioxide, carbon monoxide, oxidants and ozone, hydrocarbons- particulate matter.
- Sampling and analysis of Solid and hazardous waste. measurement and analysis of sound. Percentile indices of noise, equivalent sound pressure level (Leq), Noise pollution level (NPL), Sound exposure level (SEL), Titrimetry, Gravimetry, Bomb Calorimetry, Chromatography (Paper Chromatography, TLC, GC and HPLC), Flame photometry, Spectrophotometry (UV-VIS, AAS, ICP-AES, ICP-MS), Electrophoresis, XRF, XRD, NMR, FTIR, GC-MS, SEM, TEM.

Unit-III: Environmental Pollution and Control

- Air Pollution- Sources and types of Pollutants - Natural and anthropogenic sources, primary and secondary pollutants.
- Criteria air pollutants, Indian National Ambient Air Quality Standards. Dispersion of air pollutants.

- Mixing height/depth, lapse rates, Gaussian plume model, line source model and area source model.
- Control devices for particulate matter: Principle and working of: settling chamber, centrifugal collectors, wet collectors, fabric filters and electrostatic precipitator.
- Control of gaseous pollutants through adsorption, absorption, condensation and combustion including catalytic combustion.
- Indoor air pollution, Vehicular emissions and Urban air quality. Noise control and abatement measures:
- Active and Passive methods.
- Drinking water treatment: Coagulation and flocculation, Sedimentation and Filtration, Disinfection and Softening.
- Wastewater Treatment: Primary, Secondary and Advanced treatment methods. Common effluent treatment plant.
- Soil Pollution control.
- Industrial effluents and their interactions with soil components. Soil micro-organisms and their functions.
- Methods of Abatement of Marine Pollution.
- Coastal management. Radioactive pollution – sources, biological effects of ionizing radiations, radiation exposure and radiation standards, radiation protection.
- Solid waste processing and recovery – Recycling, recovery of materials for recycling and direct manufacture of solid waste products.
- Electrical energy generation from solid waste (Fuel pellets, Refuse derived fuels), composting and vermicomposting, biomethanation of solid waste.
- Disposal of solid wastes – sanitary land filling and its management, incineration of solid waste.

Unit-VI: Environmental Legislation

- Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987.
- Conference of Parties (COPs), Basel Convention (1989, 1992), Ramsar Convention on Wetlands (1971), Earth Summit at Rio de Janeiro, 1992, Agenda-21, Global Environmental Facility (GEF), Convention on Biodiversity (1992), UNFCCC, Kyoto Protocol, 1997.
- Clean Development Mechanism (CDM), Earth Summit at Johannesburg, 2002, RIO+20, UN Summit on Millennium Development Goals, 2000.
- Copenhagen Summit, 2009. IPCC, UNEP, IGBP.
- Constitutional provisions in India.
- Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975, Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986,
- Motor Vehicle Act, 1988.

- The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, The Plastic Waste Management Rules, 2016, The Bio-Medical Waste Management Rules, 2016, The Solid Waste Management Rules, 2016, The e-waste (Management) Rules 2016.
- The Construction and Demolition Waste Management Rules, 2016, The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000, The Batteries (Management and Handling) Rules, 2010 with Amendments.
- The Public Liability Insurance Act, 1991 and Rules 1991, Noise Pollution (Regulation and Control) Rules, 2000, Coastal Regulation Zones (CRZ) 2019.
- EIA Guidelines. Impact Assessment Methodologies.
- Procedure for reviewing EIA of developmental projects.
- Life-cycle analysis, cost-benefit analysis.
- Guidelines for Environmental Audit. Environmental Planning as a part of EIA and Environmental Audit.
- Environmental Management System Standards (ISO14000 series).
- EIA Notification, 2006 and amendments from time to time. Eco-labeling schemes.

Unit-V: Global and National Environmental Problems:

- Global Environmental Issues – Biodiversity loss, Climate change, Ozone layer depletion. Sea level rise. International efforts for environmental protection.
- National Action Plan on Climate Change (Eight National missions – National Solar Mission, National Mission for Enhanced Energy Efficiency.
- National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a 'Green India'.
- National Mission for Sustainable Agriculture, National Mission on Strategic Knowledge for Climate Change).
- Epidemiological Issues: Fluorosis, Arsenocosis, Goitre, Dengue. Environmental Disasters: Minnamata Disaster, Love Canal Disaster, Bhopal Gas Disaster, 1984, Chernobyl Disaster, 1986, Fukusima Daiichi nuclear disaster, 2011.
- Energy and Environment: Sun as source of energy; solar radiation and its spectral characteristics.
- Fossil fuels: classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas. Shale oil, Coal bed Methane, Gas hydrates.
- Gross-calorific value and net-calorific value.
- Principles of generation of hydro-power, tidal energy, ocean thermal energy conversion, wind power, geothermal energy, solar energy (solar collectors, photo-voltaic modules, solar ponds).
- Nuclear energy - fission and fusion, Nuclear fuels, Nuclear reactor – principles and types. Bioenergy, Environmental implications of energy use

PART - B

DOMAIN SPECIFIC SUBJECT

11. Mass Communication and Journalism

Unit I: Foundations of Journalism and Mass Communication

- Introduction to Journalism and Mass Communication: Concept and Definition of Journalism and Mass Communication, Historical Development: Print and Electronic Media, Role of Media in Democratic Societies, Media and Communication Models
- Media Ethics and Regulations: Press Council and Media Commissions of India Media Laws: Freedom of Speech and Expression, Defamation, Privacy Ethics in Journalism: Accuracy, Fairness, and Responsibility Challenges in Ethical Reporting and Media Trials Media
- Theories and Approaches Normative Theories: Authoritarian, Libertarian, Social Responsibility Critical Approaches: Cultural Studies, Feminist Media Theory Information and Knowledge Societies Technological Determinism and Media Ecology
- Media and Society Media's Role in Social Change and Public Opinion Media Literacy and Media Criticism Media's Impact on Cultural Identity Globalization and Media Convergence

Unit II: Reporting, Editing, and Media Production

- News Reporting and Writing News Values and Determinants Reporting for Print, Television, Digital Media Techniques of Investigative and Forensic Journalism Niche Reporting: Science, Sports, Crime
- Editing and Newsroom Management Editing Techniques for Print and Digital Media Proofreading, Fact-Checking, and Verification Role of Editors and Newsroom Ethics Newsroom Automation and Digital Tools
- Media Production Techniques Basics of Print, Radio, Television, and Digital Production Content Creation and Multimedia Storytelling Social Media Production and Engagement Visual Communication: Infographics and Data Journalism
- Journalism as a Profession Skills and Competencies of a Journalist Code of Conduct and Ethical Challenges Emerging Roles in Digital Journalism Career Prospects in Forensic Journalism

Unit III: Advertising, Public Relations, and Corporate Communication

- Advertising and Marketing Communication Concept and Evolution of Advertising Theories and Models of Advertising Communication Campaign Planning and Media Strategy Creative and Strategic Copywriting
- Public Relations Strategies PR in Public, Private, and Non-Profit Sectors Crisis Communication and Image Management Media Relations and Corporate Social Responsibility Community Engagement and Stakeholder Communication

- Branding and Media Planning Brand Positioning and Identity Building Media Buying and Audience Analysis Digital Branding and Social Media Strategies Integrated Marketing Communication (IMC)
- Media Campaigns and Impact Analysis Designing Effective Campaigns for Print and Digital Media Evaluating Campaign Effectiveness Role of Social Media in Public Relations Case Studies of Successful Campaigns

Unit IV: Media Laws, Policies, and Cyber Journalism

- Media Laws and Ethics Freedom of Speech and Expression in the Indian Constitution Defamation, Libel, Slander, and Right to Privacy IT Act, Copyright Act, and Cyber Laws Regulations for Forensic Journalism and Digital Media
- Media Policies and Governance Media Ownership Patterns and Concentration Government Policies on Media and Communication Press Freedom and Regulatory Frameworks Role of TRAI, ASCI, and PCI
- Cyber Journalism and Digital Ethics Online Journalism: Ethics and Challenges Cyber Crimes Related to Digital Journalism Social Media Regulations and Content Moderation Digital Security and Data Protection for Journalists
- Fact-Checking and Countering Misinformation Techniques for Detecting Fake News Fact-Checking Organizations and Protocols Misinformation in Social Media Contexts Legal and Ethical Aspects of Fact-Checking

Unit V: Communication Research and Emerging Trends

- Communication Research Methods Quantitative and Qualitative Approaches Content Analysis, Discourse Analysis, Ethnography Data Collection Techniques: Surveys, Interviews, Focus Groups Research Ethics and Integrity
- Data Journalism and Big Data Basics of Data Collection and Processing Data Visualization and Interpretation Open Data for Investigative Reporting Ethical Issues in Data Journalism
- Emerging Technologies in Journalism AI in News Production: Automation and Personalization Virtual Reality (VR) and Augmented Reality (AR) in Storytelling Blockchain for Securing Journalistic Content Digital Archiving and Preservation
- Media Literacy and Critical Thinking Teaching Media Literacy in Academic Settings Critical Media Analysis: Bias and Framing Digital Literacy in the Age of Misinformation Training Journalists in Analytical Thinking

PART - B

DOMAIN SPECIFIC SUBJECT

12. English Language and Literature

Unit I: English Literature

- British Literature: From Chaucer to Contemporary Periods: Medieval, Renaissance, Neo-Classical, Romantic, Victorian, Modern, and Postmodern Major Authors: Chaucer, Shakespeare, Milton, Wordsworth, Keats, Tennyson, Eliot, Woolf, Rushdie Genres and Forms: Poetry, Drama, Novel, Prose,
- Criticism Literary Movements: Metaphysical Poetry, Romanticism, Victorianism, Modernism, Postmodernism Major Themes: Colonialism, Postcolonialism, Feminism, Modernity, Identity American Literature: Classic to Contemporary Major Movements: Puritanism, Transcendentalism, Realism, Modernism, Postmodernism Major Authors: Whitman, Dickinson, Twain, Fitzgerald, Faulkner, Morrison, Plath Themes: Race, Identity, Multiculturalism, Migration, American Dream Genres: Poetry, Drama, Novel, Short Story,
- Criticism Indian English Literature Early Writings: Pre-Independence Literature Modern Indian Writing: Postcolonial Narratives Major Authors: Tagore, Rao, Rushdie, Desai, Roy, Adiga Themes: Nationalism, Caste, Gender, Diaspora, Identity Literary Theory and Criticism
- Classical to Modern Criticism: Aristotle, Dryden, Eliot, Derrida Theoretical Approaches: Structuralism, Poststructuralism, Postcolonialism, Feminism, Cultural Studies Key Concepts: Mimesis, Intertextuality, Deconstruction, Identity Politics

Unit II: English Language

- History and Evolution of the English Language Old English, Middle English, Modern English Linguistic Influences: Latin, French, Norse Sound Changes and Language Shifts
- Phonology and Phonetics of English Phonemes, Stress, Intonation Phonetic Transcription (IPA) Distinctive Features, Minimal Pairs
- Syntax and Morphology Phrase Structure Rules, Sentence Types Morphological Processes: Inflection, Derivation Transformational Grammar and Generative Syntax
- Semantics and Pragmatics Meaning Relations: Synonymy, Antonymy, Polysemy Speech Acts, Pragmatic Competence Context and Implicature

Unit III: English Language Teaching (ELT)

- Approaches and Methods in ELT Traditional Methods: Grammar-Translation, Direct Method Communicative Methods: CLT, Task-Based Learning Emerging Trends: Blended Learning, Technology-Enhanced Learning
- Curriculum Design and Materials Development Needs Analysis, Syllabus Design Authentic and Adapted Materials

- Testing and Evaluation in ELT Types of Tests: Formative, Summative, Diagnostic Assessment Techniques: Written, Oral, Portfolio
- Language Acquisition and Language Learning First Language Acquisition vs. Second Language Learning Theories: Behaviourist, Innatism, Interactionist

Unit IV: Linguistics

- Morphology and Syntax Word Formation Processes, Morphological Typology Syntax: Tree Diagrams, Syntactic Structures
- Sociolinguistics and Dialectology Language Variation: Dialects, Sociolects, Idiolects Bilingualism, Multilingualism, Code-Switching
- Stylistics and Discourse Analysis Textual Cohesion, Coherence, Discourse Markers Analysing Literary and Non-Literary Texts
- Cognitive and Computational Linguistics Cognitive Linguistics: Conceptual Metaphor, Embodiment, Categorisation Computational Linguistics: Corpus Linguistics, Text Mining, Sentiment Analysis, Speech Recognition, Machine Translation

Unit V: Interdisciplinary and Technological Perspectives

- Digital Humanities Use of digital tools for analyzing literary texts Text encoding, digital archiving, and data visualization
- Cultural and Media Studies Analyzing popular culture, media discourse Intersection of technology and culture
- Environmental and Medical Humanities Ecocriticism: Literature and environmental change, medical narratives and their cultural implications
- Critical Theory and New Perspectives Posthumanism, Gender Studies, Disability Studies Memory Studies: Identity and Representation