

PhD Entrance Test -2024-25

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)

The syllabus for research Methodology and various Domain specific subjects are shown below:



Domain specific Area

RESEARCH METHODOLOGY (COMMON PAPER)

PhD Entrance Test-Syllabus-2024-25

Unit-I

Introduction to research methodology: objectives and types of research, motivation of research, research methods vs methodology. Types of research. descriptive vs. analytical, applied vs. fundamental, quantitative vs. qualitative, conceptual vs. empirical.

Unit-II

Research problem formulation: defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review primary and secondary sources, web as a source, searching the web, critical literature review, Identifying gap areas from literature review, development of working hypothesis, types of hypothesis.

Unit-III

Research design: research design, basic principles, need of research design, features of good design, types of research design, important concepts relating to research design, observation and facts, laws and theories, prediction and explanation, induction, deduction, development of models, developing a research plan, exploration, description, diagnosis and experimentation, qualitative research, quantitative research, concept of measurement, measurement scales, validity and reliability.

Unit-IV

Sampling: Concepts of statistical population, sample, sampling frame, sampling error, sample size, characteristics of a good sample, probability and non-probability sampling, determining sample size, practical considerations in sampling and sample size determination.

Unit-V

Data Analysis and Interpretation: Data preparation, univariate analysis (frequency tables, bar charts, pie charts, percentages), bivariate analysis, cross tabulations and chi-square test including testing hypothesis, multivariate analysis, parametric test and non-parametric test.

Unit-VI



Reporting and thesis writing: Structure and components of scientific reports, types of reports, significance, different steps in the preparation of reports, layout, structure and language of reports, illustrations and tables, bibliography, referencing and footnotes, oral presentation, planning, preparation, practice, use of visual aids, importance of effective communication.

Unit-VII

Application of results and ethics, Environmental impacts, ethical issues, copyright, royalty, intellectual property rights and patent law, trade related aspects of intellectual property rights, reproduction of published material, plagiarism, citation and acknowledgement, reproducibility and accountability.



Domain specific Area
BEHAVIOURAL FORENSICS
(Forensic Psychology/Criminology/Clinical Psychology)
PhD Entrance Test-Syllabus-2024-25

1. Emergence of Psychology

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.

2. Psychological testing

Types of tests; Test construction: Item writing, item analysis; Test standardization: Reliability, validity and Norms; Areas of testing: Intelligence, creativity, neuropsychological tests, aptitude, Personality assessment, interest inventories; Attitude scales – Semantic differential, Staples, Likert scale. Computer-based psychological testing; Applications of psychological testing in various settings: Clinical, Organizational and business, Education, Counseling, Military. Career guidance.

3. Biological basis of behavior:

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. Genetics and behavior: Chromosomal anomalies; Nature-Nurture controversy [Twin studies and adoption studies]

4. 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

5. Thinking, Intelligence and Creativity

Theoretical perspectives on thought processes: Associationism, Gestalt, Information processing, Feature integration model; Concept formation: Rules, Types, and Strategies; Role of concepts in thinking Types of Reasoning, Language and thought; Problem solving: Type, Strategies. and Obstacles Decision-making: Types and models; Metacognition: Metacognitive knowledge and Metacognitive regulation; Intelligence: Spearman; Thurstone; Jensen; Cattell; Gardner; Stenberg; Goleman; Das, Kar & Parrila; Creativity: Torrance, Getzels & Jackson, Guilford, Wallach & Kogan Relationship between Intelligence and Creativity

6. Personality, Motivation, emotion, stress and coping

Determinants of personality: Biological and socio-cultural Approaches to the study of personality: Psychoanalytical, Neo-Freudian, Social learning, Trait and Type, Cognitive, Humanistic, Existential, Transpersonal psychology. Other theories: Rotter's Locus of Control, Seligman's Explanatory styles, Kohlberg's theory of Moral development. Basic motivational concepts: Instincts, Needs, Drives, Arousal, Incentives, Motivational Cycle. Approaches to the study of motivation: Psychoanalytical, Ethological, S-R Cognitive, Humanistic Exploratory behavior and curiosity Zuckerman's Sensation seeking Achievement, Affiliation and Power Motivational Competence; Self-regulation Flow; Emotions: Physiological correlates, Theories of emotions: James-Lange, Canon-Bard, Schachter and Singer, Lazarus, Lindsley. Emotion regulation; Conflicts: Sources and types Stress and Coping: Concept, Models, Type A, B, C, D behaviors, Stress management strategies [Biofeedback, Music therapy, Breathing exercises, Progressive Muscular Relaxation, Guided Imagery, Mindfulness, Meditation, Yogasana, Stress Inoculation Training].

7. Social Psychology

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.

8. Human Development and Interventions

Developmental processes: Nature, Principles, Factors in development, Stages of Development. Successful aging. Theories of development: Psychoanalytical, Behavioristic, and Cognitive. Various aspects of development: Sensory- motor, cognitive, language, emotional, social and moral. Psychopathology: Concept, Mental Status Examination, Classification, Causes; Psychotherapies: Psychoanalysis, Person-centered, Gestalt, Existential, Acceptance Commitment Therapy, Behavior therapy, REBT, CBT, MBCT, Play therapy, Positive psychotherapy, Transactional Analysis, Dialectic behavior therapy, Art therapy, Performing Art Therapy, Family therapy. Applications of theories of motivation and learning in School Factors in educational achievement; Teacher effectiveness; Guidance in schools: Needs, organizational set up and techniques Counselling: Process, skills, and techniques

9. Emerging Areas

Issues of Gender, Poverty, Disability, and Migration: Cultural bias and discrimination. Stigma, Marginalization, and Social Suffering; Child Abuse and Domestic violence. Peace psychology: Violence, non-violence, conflict resolution at macro level, role of media in conflict resolution. Wellbeing and self-growth: Types of wellbeing [Hedonic and Eudemonic], Character strengths, Resilience and Post-Traumatic Growth. Health: Health promoting and health compromising behaviors, Life style and Chronic diseases [Diabetes, Hypertension, Coronary Heart Disease], Psychoneuroimmunology [Cancer, HIV/AIDS]; Psychology and technology interface: Digital learning; Digital etiquette: Cyber bullying; Cyber pornography: Consumption, implications; Parental mediation of Digital Usage.

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Domain specific Area

CYBER SECURITY AND DIGITAL FORENSICS

PhD Entrance Test Syllabus-2024-25

- Fundamentals of Operating Systems,
- Computer Organization & Architecture,
- Networking Concepts,
- Programming Concepts, Data Structure,
- Assembly Language, Database Management System (DBMS & RDBMS),
- Internet of Things, Blockchain,
- Cloud Computing,
- Cryptography,
- Web & Mobile Technology,
- Darkweb,
- Software Engineering,
- System Analysis & Design,
- Artificial Intelligence (AI),
- Cyber Security,
- Digital Forensics,
- Cyber Crime Investigation,
- Malware Analysis,
- Emerging Trends and Technologies in the field of Computer and IT.

PhD Entrance Test Syllabus-2024-25

DOMAIN: SCHOOL OF ENGINEERING AND TECHNOLOGY

Sub Domain specific Area: (I) -Nanotechnology & Food Technology

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

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.

Nanotechnology: Historical prospective 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)

Food Technology: Food Chemistry: Water, Carbohydrates, Proteins, Lipids, Enzymes, Vitamins, Minerals, Pigments, Flavours, 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.

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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, ISO 17025, NABL

PhD Entrance Test Syllabus-2024-25

DOMAIN: SCHOOL OF ENGINEERING AND TECHNOLOGY

Sub Domain-specific Area: (II) – Structural /Civil Engineering

1. 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 normal stresses

2. 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

3. 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

4. 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

5. Earthquake Engineering and Soil Mechanics

Earthquake Engineering: Dynamics of Structures -Free and forced vibration of single and multi-degree of freedom systems; modes of vibration, Rayleigh-Ritz method, 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 behaviour, subsurface investigation; Foundation Engineering-shallow and deep foundations, earth and earth retaining structures

6. Evaluation, Repair and Rehabilitation of 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

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Domain specific Area

FORENSIC SCIENCE/ MEDICO-LEGAL STUDIES

PhD Entrance Test Syllabus-2024-25

1. General Forensic Science and Digital Forensics

Forensic Science: History, scope and development, Branches of Forensic Science, Scene of Crime: Nature, Types Preservation and Management, Physical Evidence: Nature and Types, Search methods, Collection and Preservation, Chain of custody, Crime scene investigation in various offences, Organization of Forensic Science Laboratories at centre and state level, Relevant sections of IPC, CrPC and IEA, Courts and Court Procedures, Expert Testimony & Witness, Criminal Profiling, Scope and limitations of Polygraphy, Brain Mapping and Narco analysis, Photography: Types, application in criminal investigation, Ethics in Forensic Science, Computer Forensics: Introduction, Types of Computer crimes, Digital evidence- Seizure, Acquisition and Forensic examination, Mobile Forensics, Multimedia Forensics

2. Analysis and Instrumentation in Forensic Science

Electromagnetic radiation and its properties, Electromagnetic Spectrum, Atomic and Molecular Spectra, Preparation and conversion of Normal, Molar, Percent, PPM solutions. Qualitative and Quantitative analysis, Calibration Curve, Standard addition method, Internal Standard method, pH, Buffer, Physiological solutions

Spectrophotometric Techniques: Absorption, Emission, UV, Visible, IR, Raman, AAS, AES, OES, NMR, Mass spectroscopy, HR-MS, Chromatographic and Hyphenated Techniques: TLC, GC, HPLC, HPTLC, GC-MS, GC-HS LC-MS, LC-MS/MS, ICP-MS, Microscopy: Polarizing, Comparison, Stereoscopic, Fluorescent and Electron Microscopes, AFM, Electrophoresis, Neutron Activation Analysis, X - rays and x-ray based techniques such as XRD, XRF, Immunoelectrophoresis, Immunoassays: Principle, Types, Techniques and application.

3. Forensic Chemistry, Toxicology and Medico legal aspects

Illicit liquor, Analysis of Ethyl alcohol in beverages, liquors, biological fluids and breath,, Analysis of Chemicals in Trap Cases, Poison and its classification, Toxicology and Chemical examination of Insecticides & Pesticides, Tranquillizers & Sedatives- Hypnotics, Stimulants, Depressants, Narcotics, Opiates, Drugs of abuse, Designer drugs. Plant poisons, Animal Poisons

and Metallic Poisons, Fire and Arson: Analyses of Petroleum Products and other incendiary materials Explosives, Classical and New methods of Extraction, Isolation & Clean-up procedures, Identification of common poisons from viscera, tissues and body fluids, Modes & Manner of deaths, Sexual offences and its medicolegal, importance, Amendments in law related to sexual offences, Post-mortem examination and Post-mortem changes, Estimation of time since death, Injuries & Wounds: Types, Medicolegal importance, Gunshot wounds

4. Forensic Biology, Anthropology and Wildlife Forensics

Detection and Identification of Blood stains, Determination of Species of Origin, Blood Group Systems, Techniques of Determination of Blood groups of Blood Stains, Detection of Seminal and other body fluids and their Blood, Grouping, Red cells Enzymes, Serum Proteins of forensic Significance, Disputed Paternity & Maternity, DNA: Structure, DNA as genetic marker, DNA Extraction and, Profiling Techniques: DNA Phenotyping and RNA Profiling & their applications 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 Wild life Forensics: Wild life (Protection) Act, 1972, Scope, Evidences and Identification

5. Forensic Physics, Fingerprint and Document Examination

Fingerprints: History, Characteristics, Types, Classification, Preservation, Development, Lifting and Comparison, Examination of Chance Prints, Computerization of Fingerprints, AFIS, Voice Analysis, Voice spectrograph, Legal aspects and limitations, Documents: Definition, Types, Preliminary examination, Reproduction of documents through photographic and mechanical means and their examination Examination of Alterations such as Erasures, Obliterations & Additions Indentations, Secret writings and Charred documents Inks, Papers and their scientific examinations with modern methods Age of documents, Examination of Typescripts, Printed matter including currency notes and lottery tickets. Mechanical impressions, Hand writings: Class and Individual characteristics of Handwritings, Factors affecting handwritings, Standard samples for comparison, Comparison of hand-written text, Anonymous and disguised writings, Identification of hand writings, signatures, detection of forged signature and forgeries, Examination of Credit Cards and Similar materials

6. Forensic Physics and Ballistics

Nature and Examination and Forensic applications of Hair, Fiber, Pollens and Diatoms:, Dust & Soil:, Paint, Lacquer & Varnishes, Glass: Composition, Types, Fractures, Examination, Cement,

Mortar and Concrete, Track Marks: Foot Prints, Shoe Prints, Tire Marks, Their Preservation & Casting, Comparison, Skid marks. Gait pattern Biometric Systems, Tool marks: Types, Examination & Restoration of Erased Markings on Metal Surfaces

Fire arms: Types, Classification, Ammunition and their Compositions

Forensic examination of Firearms, Ammunition, Firearms' projectiles (Bullets, Shots, Slug etc.), Shell case, Gunshot residues analysis, Concept of Velocity, Penetration, Dispersion, Ricochet, Accidental, Discharge, Determination of Range in firearm cases, Examination of Country made firearms, Basics of Internal, External and Terminal Ballistics: Definition, Types and Analyses Bombs: Country made bombs, Improvised Explosive Devices (IEDs) and their examination Investigation in Explosion and Arson related cases



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Domain Specific Area

LAW

PhD Entrance Test Syllabus-2024-25

UNIT – I: JURISPRUDENCE

1. Nature and sources of law
2. Schools of jurisprudence
3. Law and morality
4. Concept of rights and duties
5. Legal personality
6. Concepts of property, ownership and possession
7. Concept of liability
8. Law, poverty and development
9. Global justice
10. Modernism and post-modernism

UNIT – II: CONSTITUTIONAL AND ADMINISTRATIVE LAW

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

UNIT – III: PUBLIC INTERNATIONAL LAW AND IHL

1. International law – Definition, nature and basis
2. Sources of International law
3. Recognition of states and governments
4. Nationality, immigrants, refugees and internally displaced persons (IDPs)
5. Extradition and asylum
6. United Nations and its organs
7. Settlement of international disputes
8. World Trade Organization (WTO)

9. International humanitarian law (IHL) - Conventions and protocols
10. Implementation of IHL - Challenges

UNIT – IV: LAW OF CRIMES

1. General principles of criminal liability – Actus reus and mens rea, individual and group liability
constructive liability
2. Stages of crime and inchoate crimes - Abetment, criminal conspiracy and attempt
3. General exceptions
4. Offences against human body
5. Offences against state and terrorism
6. Offences against property
7. Offences against women and children
8. Drug trafficking and counterfeiting
9. Offences against public tranquility
10. Theories and kinds of punishments, compensation to the victims of crime

UNIT – V: LAW OF TORTS AND CONSUMER PROTECTION

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

UNIT – VI: COMMERCIAL LAW

1. Essential elements of contract and e-contract
2. Breach of contract, frustration of contract, void and voidable agreements
3. Standard form of contract and quasi-contract
4. Specific contracts - Bailment, pledge, indemnity, guarantee and agency

5. Sale of Goods Act, 1930
6. Partnership and limited liability partnership
7. Negotiable Instruments Act, 1881
8. Company law – Incorporation of a company, prospectus, shares and debentures
9. Company law – Directors and meetings
10. Corporate social responsibility

UNIT-VII: FAMILY LAW

1. Sources and schools
2. Marriage and dissolution of marriage
3. Matrimonial remedies - Divorce and theories of divorce
4. Changing dimensions of institution of marriage – Live-in relationship
5. Recognition of foreign decrees in India on marriage and divorce
6. Maintenance, dower and stridhan
7. Adoption, guardianship and acknowledgement
8. Succession and inheritance
9. Will, gift and wakf
10. Uniform Civil Code

UNIT –VIII: ENVIRONMENT AND HUMAN RIGHTS LAW

1. Meaning and concept of 'environment' and 'environmental pollution'
2. International environmental law and UN Conferences
3. Constitutional and legal framework for protection of environment in India
4. Environmental Impact Assessment and control of hazardous waste in India
5. National Green Tribunal
6. Concept and development of human rights
7. Universalism and cultural relativism
8. International Bill of Rights
9. Group rights – Women, children, persons with disabilities, elderly persons, minorities and weaker sections
10. 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 –IX: INTELLECTUAL PROPERTY RIGHTS AND INFORMATION TECHNOLOGY LAW

1. Concept and meaning of intellectual property

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

UNIT – X: COMPARATIVE PUBLIC LAW AND SYSTEMS OF GOVERNANCE

1. Comparative Law – Relevance, methodology, problems and concerns in Comparison
2. Forms of governments – Presidential and parliamentary, unitary and federal
3. Models of federalism – USA, Canada and India
4. Rule of Law – ‘Formal’ and ‘substantive’ versions
5. Separation of powers – India, UK, USA and France
6. Independence of judiciary, judicial activism and accountability – India, UK and USA
7. Systems of constitutional review – India, USA, Switzerland and France
8. Amendment of the Constitution – India, USA and South Africa
9. Ombudsman – Sweden, UK and India
10. Open Government and Right to Information - USA, UK and India

Domain specific Area

MANAGEMENT

PhD Entrance Test Syllabus-2024-25

Unit –I

Management–Concept,Process,Theories and Approaches,Management Roles and Skills
Functions–Planning,Organizing,Staffing,CoordinatingandControlling.Communication– Types,
Process and Barriers.

Decision Making– Concept,Process, Techniques and Tools Organisation Structure and Design–
Types, Authority, Responsibility,Centralisation, Decentralisation and Span of Control
Managerial Economics –Concept & Importance

Demand analysis – Utility Analysis, Indifference Curve, Elasticity & Forecasting Market
Structures–Market Classification &Price Determination National Income – Concept, Types and
Measurement Inflation – Concept, Types and Measurement Business Ethics& CSR Ethical
Issues &Dilemma Corporate Governance Value Based Organisation

Unit–II

Organisational Behaviour –Significance & Theories IndividualBehaviour–
Personality,Perception,Values,Attitude,LearningandMotivation Group Behaviour – Team
Building, Leadership, Group Dynamics Interpersonal Behaviour & Transactional Analysis
Organizational Culture & Climate Work Force Diversity & Cross Culture Organisational
Behaviour Emotions and Stress Management Organisational Justice and Whistle Blowing
Human Resource Management Concept, Perspectives, Influences and Recent Trends Human
Resource Planning, Recruitment and Selection, Induction, Training and Development Job
Analysis, Job Evaluation and Compensation Management

Unit–III

Strategic Role of Human Resource Management Competency Mapping & Balanced Score board
Career Planning and Development Performance Management and Appraisal Organization
Development, Change &OD

Interventions Talent Management & Skill Development Employee Engagement & Work Life
Balance

Industrial Relations: Disputes & Grievance Management, Labour Welfare and Social Security
Trade Union & Collective Bargaining International Human Resource Management–HR
Challenge of International Business Green HRM

Unit–IV

Accounting Principles and Standards, Preparation of Financial Statements Financial Statement Analysis–Ratio Analysis, Funds Flow and Cash Flow Analysis, DuP on Analysis Preparation of Cost Sheet, Marginal Costing, Cost Volume Profit Analysis Standard Costing & Variance Analysis Financial Management, Concept & Functions Capital Structure – Theories, Cost of Capital, Sources and Finance Budgeting and Budgetary Control, Types and Process, Zerobase Budgeting Leverages–Operating, Financial and Combined Leverages, EBIT– EPS Analysis, Financial Break even Point & Indifference Level.

Unit–V

Value & Returns–Time Preference for Money, Valuation of Bonds and Shares, Risk and Returns; Capital Budgeting– Nature of Investment, Evaluation, Comparison of Methods; Risk and Uncertainty Analysis Dividend–Theories and Determination Mergers and Acquisition– Corporate Restructuring, Value Creation, Merger Negotiations, Leveraged Buyouts, Takeover Portfolio Management–CAPM, APT Derivatives–Options, Option Payoffs, Option Pricing, Forward Contracts & Future Contracts Working Capital Management–Determinants, Cash, Inventory, Receivables and Payables Management, Factoring International Financial Management, Foreign exchange market

Unit-VI

Strategic Management–Concept, Process, Decision & Types Strategic Analysis External Analysis, PEST, Porter’s Approach to industry analysis, Internal Analysis – Resource Based Approach, Value Chain Analysis Strategy Formulation– SWOT Analysis, Corporate Strategy– Growth, Stability, Retrenchment, Integration and Diversification, Business Portfolio Analysis - BCG, GE Business Model, Ansoff’s Product Market Growth Matrix Strategy Implementation Challenges of Change, Developing Programs Mckinsey 7s Framework Marketing Concept, Orientation, Trends and Tasks, Customer Value and Satisfaction Market Segmentation, Positioning and Targeting Product and Pricing Decision–Product Mix, Product Life Cycle, New Product development, Pricing –Types and Strategies Place and promotion decision – Marketing channels and value networks, VMS, IMC, Advertising and Sales promotion

Unit–VII

Consumer and Industrial Buying Behaviour: Theories and Models of Consumer Behaviour Brand Management– Role of Brands, Brand Equity, Equity Models ,Developing a Branding Strategy; Brand Name Decisions ,Brand Extensions and Loyalty Logistics and Supply Chain Management, Drivers, Value creation, Supply Chain Design, Designing and Managing Sales Force, Personal Selling Service Marketing–Managing Service Quality and Brands, Marketing Strategies of Service Firms Customer Relationship Marketing– Relationship Building, Strategies, Values and Process Retail Marketing– Recent Trends in India, Types of Retail Outlets.



गृह मंत्रालय
MINISTRY OF
HOME AFFAIRS

राष्ट्रीय न्यायालयिक विज्ञान विश्वविद्यालय
(राष्ट्रीय महत्त्व का संस्थान, गृह मंत्रालय, भारत सरकार)
National Forensic Sciences University
(An Institution of National Importance under Ministry of Home Affairs,
Government of India)



Emerging Trends in Marketing–Concept of Marketing, Direct Marketing, Digital Marketing and Green Marketing

International Marketing– Entry Mode Decisions, Planning Marketing Mix for International Markets

Unit–VIII

Statistics for Management: Concept, Measures Of Central Tendency and Dispersion, Probability Distribution–Binomial, Poisson, Normal and Exponential

Data Collection & Questionnaire Design Sampling–Concept, Process and Techniques Hypothesis Testing – Procedure; T, Z, F, Chi-square

tests Correlation and Regression Analysis Operations Management–Role and Scope

Facility Location and Layout–Site Selection and Analysis, Layout–Design and Process

Enterprise Resource Planning – ERP Modules, ERP implementation Scheduling; Loading, Sequencing and Monitoring Quality Management and Statistical Quality Control, Quality Circles

, Total Quality Management– KAIZEN, Benchmarking, Six Sigma; ISO 9000 Series Standards

Operation Research–Transportation, Queuing Decision Theory, PERT/CPM

Unit–IX

International Business–Managing Business in Globalization Era; Theories of International Trade; Balance of payment Foreign Direct Investment– Benefits and Costs Multilateral regulation of Trade and Investment under

WTO International Trade Procedures and Documentation; EXIM Policies Role of International Financial Institutions– IMF and World Bank

Information Technology–Use of Computers in Management Applications; MIS, DSS, Artificial Intelligence and Big Data

Data Warehousing, Data Mining and Knowledge Management –

Concepts Managing Technological Change

Unit –X

Entrepreneurship Development– Concept, Types, Theories and Process, Developing Entrepreneurial Competencies Intrapreneurship–Concept and Process

Women Entrepreneurship and Rural Entrepreneurship Innovations in Business– Types of Innovations, Creating and Identifying Opportunities, Screening of Business Ideas

Business Plan and Feasibility Analysis–Concept and Process of Technical, Market and Financial Analysis

Micro and Small Scale Industries in India; Role of Government in Promoting SSI Sickness in Small Industries–Reasons and Rehabilitation Institutional Finance to Small Industries–Financial Institutions, Commercial Banks, Cooperative Banks, Micro Finance.

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15

Domain Specific Area
Police Science and Security Studies (Homeland Security)
PhD Entrance Test-Syllabus-2024-25

Unit-1: Fundamentals of Homeland Security

Origin of Homeland Security: Principles, Mission, Goals, Scope of Application

Domains of Homeland Security: Intelligence, Risk Analysis, Critical Infrastructure Protection, Disaster Management, Environment Protection, Cyber Security, Economic Security

National Security Doctrine, National Security Strategy, Role of Intelligence

Framework of Homeland Security in the US., Framework of Internal Security in India Role of Ministries, Departments, Military & Paramilitary Forces, Law Enforcement Agencies in National Security
Homegrown Threats, Radicalization, Terrorism, National Security Threats and Future Challenges

Unit-II Geo-Political Studies & Internal Security

Modern History of the World, Key Concepts & Theories of Geopolitics

Geo-Strategic importance of the Indo-Pacific, Maritime Chokepoints, Geopolitics of Energy and Environment

Indian Foreign Policy, Strategic Thinking and Diplomacy, India's strategic Importance in South Asia, India's relations with neighboring countries, China-Pakistan Nexus, Challenges and contemporary threats in India's neighborhood

India's relations with U.S., Russia, China, Japan, Israel, U.K.; India's approach to International Crises

International Organizations and Global Governance :- International Groupings-UN, EU, OPEC, APEC, India & Regional Groupings - SAARC, ASEAN, BIMSTEC, IORA, International Economic Institutions - World Bank, IMF and WTO; Economic Groupings - BRICS, G-77 and G-20.

Internal Security Elements - Socio-political stability, Territorial integrity, Economic solidarity, Ecological balance, Cultural-cohesiveness, Moral- spiritual consensus, Peace and harmony.

Internal Security Disruptors - Economic and Financial crisis, Insurgency. Naxalism, Terrorism, Poverty, Organised Crime, Corruption, Illegal immigration, Natural & Manmade Disasters, Cybercrime.

Unit-III: Role of Technology in Homeland Security

Physical Security Technologies – Access Control Systems, Barner Systems, Movement control, Security Sensors & Alarm systems Fire prevention & response, Protective Equipment, Screening and Scanning technologies: UVSS, Backscatter, Computed tomography

Surveillance Technologies - Types of Cameras, Video Management System (VMS), Video Analytics, Video Surveillance as a Service (VSaaS).

Wireless Communication technologies. Authentication Technologies - Biometrics and Behavioral biometrics. Smart Card systems – Types, Smart Readers, System planning & deployment.

Technology for National Security - Arms & Weapons, Combat & Patrol Vehicles, Satellites, Electronic warfare & counter-electronic warfare.

Unmanned Aerial Vehicles: Drones & Anti-Drone Technologies, Drone Applications & Regulations, Radars.

Unit IV: Border and Maritime Security

History of Land Warfare and Border Conflicts, Types of Borders, Border Barriers around the world, india's Borders and its strategic importance Role of Border Guarding Forces and Department of Border Management

Land Border Threats: Cross Border Terrorism and Insurgency, Challenges: Arms Smuggling, Drugs & Human Trafficking, Refugee Management, Illegal Immigration.

Border Security technologies and practices, Integrated Check Posts (ICPs) & Land Customs Stations (LCS).

History of Maritime Security and conflicts in India, Characteristics of Maritime Environment and Legal Dimensions - Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act, 1976; United Nations Convention on the Law of the Sea (UNCLOS), 1982.

Maritime Strategy of India: Roles of the Indian Navy; Structure and Jurisdiction Indian Coast Guard and Marine Police, Threats, Challenges, and Contemporary Issues

Maritime Security Practices and Technologies, India's Maritime Security initiatives

Air Defense Organization in India: Role of Indian Air Force, Air Defense Identification Zone (ADIZ), Utilization of Air Force Assets for Air Defense.

Unit-V: Intelligence & Counterintelligence

Intelligence: Definition and Characteristics, Intelligence Analysis Process, Intelligence Collection Methods

Intelligence in India: Structure & Functions, Intelligence Sharing initiatives NCTC, MAC, NATGRID, CCTNS, ICJS; Indian Intelligence Agencies - R&AW, IB, DIA, NIA; Issues of Parliamentary oversight on Indian intelligence agencies.

Intelligence in global context, Intelligence Sharing, Laws governing intelligence sharing, India's intelligence sharing with global bodies.

International Intelligence Organizations - CIA, MI6, etc.; multi-national intelligence sharing alliances; Politicization of Intelligence agencies.



See

Refugee Crisis and Intelligence; Terrorism, Naxalism, Organized Crime vis-à-vis Intelligence; Women in Intelligence; Business Intelligence Counterintelligence, Covert and Counter Surveillance – Technical Manual; Agent Operations, Counterintelligence Protection, Counter Denial and Counter Deception

Unit VI: Disaster Management

Disaster Management Organization in India

Disaster management cycle and associated activities, Evolution of Disaster Management in India Institutions and Authorities for Disaster Management, Role of different agencies in Disaster Management

Roles and responsibilities of NDRF, SDRF, Police, Media, Home Guards, Civil Defense, and Fire Brigade, Panchayati Raj Institutions, Para- military forces and Military during Disaster Management Disaster Management Technologies - mapping, remote sensing, GIS, seismology and meteorology.

Relief and Rescue Management, Man-made Disasters

Rehabilitation Management : Psychology of victims, Crisis Intervention, Social support Coping Skills.

Pandemic Management & Public Health Security, Community Based Disaster Management and Preparedness Planning (CBDP)

Unit - VII: Fundamentals of Policing

Policing - Functions, Socio-Cultural needs, History, Evolution of Modern

Policing, Indian Police Act of 1861, Policing in India after Independence, Policing in democratic and totalitarian society.

Role of Ministry of Home Affairs (MHA), Organization and structure of Police, Indian Police Service, State Police service, Subordinate Cadres, Hierarchy, Rank and File Structure, Recruitment, Training

State Police Organization - State level, Range level, Commissionerate System, District level, Sub-division/Circle level, Police Station level; Different wings of District Police, Executive powers and duties of Police Officers.

Investigation: First Information Report, charge sheet, case diary, statement of witness, confession of accused, memo of evidence and final report.

Approaches to Policing - Hot spot Policing, Evidence Based Policing, Problem Oriented Policing; Evidence Based Targeting for Problem Oriented Policing; Situational Crime Prevention.

Police Special Units: State Reserve Police Force, Anti-Terrorism Squad, Criminal Investigation Department, Economic Offences Wing, Home Guards & Civil Defense, Government Railway Police, Crime Records Bureau, Disaster Response Force, Forensic Science Laboratory.

Central Police Organizations: IB, CBI, NIA, BPR&D, etc.; Central Armed Police Forces of India,
International Criminal Police Organisation (INTERPOL)

Unit VIII: Criminal Justice System

Legislative Process and Criminal Justice System, Co-ordination in CIS Reforms in CIS (Malimath
Committee Report)

Police System and Judiciary: Maintenance of Law and Order, Investigation of Crimes, Protection of Life,
Protection of Property Rights, Prevention of Crime. Interface with the community, executive,
prosecution and judiciary.

Judicial Administration in India: Structure and Functions of Criminal Courts, Presiding Officer, Prosecutor
and Defence Counsel.

Salient Features of Indian Judicial System, Special Courts: Mahila courts, Fast Track Courts, Children
Court, Juvenile Justice Board (JJB).

Alternative Dispute Resolution System (ADRS): Arbitration, Mediation and Counselling.

Tribunals, Lok Adalats, Village Nyaya-Panchayat; Restorative Justice.

Prisons and Correctional Institutions in India, Juvenile Institutions, Institutions for women

Objectives of Imprisonment, Punishment Philosophies, Reformation & Rehabilitation approach in
Prisons.

Unit IX: Risk & Vulnerability Assessment, Critical Infrastructure Protection and Industrial Security

Risk Management Framework: ISO 31000, Risk assessment, Risk avoidance, Risk Criteria: Risk Appetite,
Benefit-Cost ratio, Asset Identification & Critical Thinking in Risk Management.

Threat Identification & Assessment: Information Gathering Techniques, Threat Agents, 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 - Understanding Infrastructure, criticality and interdependency,
significance of Security planning, Emergency Preparedness Plan, Comprehensive Security Plan,
Contingency Plan, Incident Command System & Command Center Operations - Commercial and
Industrial. Strategy for Decision Making - Risk Informed, Resilience Informed.

Design of Security Systems - Deterrence, Detection and Identification; Contemporary security focus -
Asset Protection, Disaster Recovery & Business Continuity, Crime Prevention Through Environmental
Design (CPTED)

Legal Provisions: Private Security Agency (Regulation) Act, 2005



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Post-Incident Operations, and Specialized Functions for Infrastructure Protection, Evaluating security counter-measures, Event analysis & understanding the role of Human Error.

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Domain Specific Area

PHARMACY

PhD Entrance Test Syllabus-2024-25

- 1. 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.
- 2. Importance of quality control in Food and Pharmaceuticals,** 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, Thermal Analysis and Colour Analysis
- 3. Food and 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.**
- 4. General Pharmacology, Principles of toxicology, Food-Drug interactions, Food-Food interactions, Therapeutic drug monitoring, adverse drug reaction (ADR), types of ADR, Mechanism of ADR. Drug interaction, Monitoring and reporting of ADR and its significance, Classifications of drugs, Drug toxicity.**
- 5. 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, Structure Activity Relationship (SAR).

6. Environmental science: Environmental science fundamentals: Introduction to environmental science, Ecology and ecosystems, Environmental factors and interactions

7. Environmental Chemistry: Chemical properties of pollutants, Pollutant transport and fate in the environment, Air, water and soil chemistry,

8. Environmental Policy and Regulations: International and national environmental policies, Environmental regulations and legislation, Environmental Impact Assessment processes Climate Change and Global Environmental Issues: Causes and impacts of climate change, Greenhouse gas emissions and mitigation strategies, International agreements and protocols Biodiversity and Conservation: Conservation biology principles, Threats to biodiversity, Conservation strategies and practices

9. Environmental Risk Assessment and Management: Risk assessment methodologies, Hazard identification and risk characterization, Risk management and mitigation strategies Environmental Monitoring and Data Analysis: Sampling techniques and data collection, Data analysis and interpretation, Environmental monitoring method