



**JIGYASA  
UNIVERSITY**  
(Formerly Himgiri Zee University, Dehradun)

## PH.D. ENTRANCE EXAMINATION SYLLABUS

**Session: 2025-2026**

### NOTE:

1. There will be two sections of the JU-Ph.D. Entrance Examination of total 100 Marks.
2. The first section i.e. Research Aptitude, will carry 20% Weightage.
3. The second section i.e. Core Discipline, will carry 60 % Weightage.
4. The 20 % weightage will be for personal interview based on subject knowledge.

### Paper-1

#### **RESEARCH APTITUDE** (Common for all Specialization)

Module	Content
<b>Research</b>	Research and Types of research: Meaning of Research- Objectives of Research- Motivation in Research. Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Research Process. Criteria of good Research. Research 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
<b>Sampling methods, Errors and fundamental statistics</b>	Finite and infinite population, methods of sampling, Errors, precision and accuracy, Line diagrams, Bar Diagrams, Pie Charts, Histograms, Frequency polygons, Measures of central tendency and dispersal; probability distributions, Confidence interval; Errors; levels of significance; Regression and Correlation; t-test; Analysis of variance;
<b>Logical Reasoning / Aptitude</b>	Types of reasoning, Mathematical Aptitude (Fraction, Time & Distance, Ratio, Proportion and Percentage, Profit and Loss, Interest and Discounting, Averages etc.). Evaluating and distinguishing deductive and inductive reasoning Analogies, Venn diagrams: Simple and multiple;



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## COMPUTER SCIENCE AND ENGINEERING

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Module	Content
<b>Discrete Structures</b>	Discrete Structures (sets, graphs and trees, algebraic structures, matrix algebra, elementary counting and probability), elementary calculus, linear algebra, 2-3 D geometry.
<b>Programming Aptitude &amp; Algorithm Design</b>	Ability to write and analyse programs in C/C++ to solve simple problems. Use of elementary data structures such as arrays, lists, stacks, queues, trees, graphs. Familiarity with recursion, pointers and file handling. Ability to differentiate procedure & OOP concepts, writing loop invariants and assertions. Analysis of Algorithm, Divide and Conquer, Dynamic Programming, Greedy, Backtracking, P, NP, NP-C, NP-Hard Class Problems
<b>Artificial Intelligence</b>	Knowledge Representation and organization, Search and control Strategies, Matching Techniques, Expert System Architecture
<b>Theory of Computation &amp; Compiler Construction</b>	Finite State Automata (FSM)-deterministic and non-deterministic, Regular Expression, Grammar, Derivation, Ambiguous grammar, Idea on Left-factoring and left-recursion, Push-down automata, Turing Machine, Halting problem of Turing Machine and undecidable Language, Translators, Phases of Compiler: Lexical analysis, Syntax analysis, Intermediate code generation, Code optimization, Run-Time Environment
<b>Database Management Systems &amp; Software Engineering</b>	Relational Query Languages, Transaction Processing Concepts, Process of Normalization Concepts of Indexing and Hashing. System Development Lifecycle Models, Object-Oriented Design, Software Testing, Software Metrics
<b>Computer System Organization, Architecture and Networks</b>	Machine instructions and addressing modes, ALU, Data-path and control unit, Instruction pipelining, Memory hierarchy: cache, main memory and secondary storage; I/O interface. Fundamental communication theory, Data Link Layer protocols, Internetworking, Transport Protocols, Application Layer Protocols



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## **EDUCATION**

### **Session 2025-2026**

Module	Content
<b>1. Philosophy of Education</b>	Indian Schools of Philosophy, Vedanta, Sankhya, Buddhism; Contributions of Indian Thinkers: J. Krishnamurthi, Vivekananda, Aurobindo, Tagore and Gandhi; Western schools of Philosophy: Idealism, Realism, Naturalism, Pragmatism and Existentialism
<b>2. Sociology of Education</b>	Educational Sociology and Sociology of Education; Theories of Sociology of Education; Education and Social Change, Education and Democracy; Education and Social Mobility; social equity and equality of Educational Opportunities; Education, economic growth and development
<b>3. Growth &amp; Development, Creativity, Intelligence &amp; Personality</b>	Methods of Educational Psychology; Concept of Growth & Development; Individual Differences; Education of Special Children; Creativity, Theories of Intelligence – Two factor, Multi factor, Multiple Intelligence Gardner, Gilford's Model, Hierarchical Theory, Emotional Intelligence; Theories of Personality Development & Assessment of Personality
<b>4. Learning theories &amp; Motivation</b>	Spectrum of Behaviorist theories of Learning; Spectrum of Constructivist theories of learning; Information Processing Model; Vicarious Learning (Bandura); Theories of Motivation : Physiological, Psycho-analytical, Murray's theory, Maslow's theory, Achievement Motivation
<b>5. Tools, Techniques &amp; Methods of Educational Research</b>	<p>Formulation of Research Problem, Types of Sampling, Questionnaire, Interview, Observation, Major Approaches of Research - Descriptive research, Ex-post facto research, Historical research, Experimental research Designs &amp; Qualitative Interpretation.</p> <p>Product Moment Correlation, Rank Difference Correlation, Normal probability Curve, Skewness and Kurtosis; Inferential Statistics - Null Hypothesis, Type I and Type II errors, one and two tailed tests, Standard error, Confidence limits, t-test, F-test-One-way ANOVA, Non- Parametric Tests -Chi-square Tests of Equality and Independence.</p>



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## **JOURNALISM AND MASS COMMUNICATION**

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Module	Content
<b>Theories of Mass Communication</b>	Theories of Mass Communication- Symbolic Convergence Theory, Media Ecology, Semiotics, Hall - Cultural Studies, Hypodermic or Bullet Theory, Selective Exposure and Selective Perception, Paul Lazarsfeld - Two-step Flow Theory, Gerbner - Cultivation Theory, McComb and Shaw - Agenda-setting Theory, Katz - Uses and Gratifications, New Media Theories; Normative Theories of Mass Media, Authoritarian Theory, Free Press Theory, Social Responsibility Theory, Communist Media Theory, Development Communication
<b>History and Development of Journalism</b>	History and development of the press, Press freedom, Journalism ethics, Media roles and responsibilities, Media bias, Media framing, Yellow journalism, Journalism: content and design, Newspapers, magazines and tabloids, Television and radio journalism, Journalism in the era of the internet, Online journalism, New media, Alternative media, Community media, Issues and challenges
<b>Film Studies</b>	Cinema as a medium of art, Cinema history: From Hollywood and Europe to India, Film forms: Narrative and Non-narrative, Film and postmodernism, Post structuralism and deconstruction, Impressionism, Expressionism and surrealism, Fiction: realism, symbolic simulation- typology genres of fiction, Cinema and Identities, Representation: Gender, Lesbian and gay, National and Regional Identities, Bollywood Vs others, World Cinema- American, British, Italian, French and Japanese
<b>Communication for Development and Social Change</b>	Issues in development and development support communication: Population, Health, Agriculture, Education, Industrial, Economic, Science and technology, Environment, National integration. Communication through visual artistic forms, dance, music and rituals, songs, stories, paintings, dance, music, tapestries, folklore and rituals that circulate in tribal cultures and rural India, ICT for development, Environmental communication, Science communication, Health communication, Agricultural communication, Educational communication, Women in development (WID), Gender and
<b>Marketing Communication: Advertising</b>	Target/Geographical market, positioning, Brand strength measurement, message research, Communication effectiveness, Campaign designing and testing, PR and Corporate Communication: Industrial relation and public relations, Customer relations and media relations, Managing corporate crisis: National and international case studies, Event Management: Event planning, Budgeting, Implementation and Evaluation, Study of audience profile, perception and reception of communication



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## **LEGAL STUDIES**

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Module	Content
M1	Constitutional Law Jurisprudence Public International Law
M2	Family Law Administrative Law Criminal Law
M3	Law of Contract-I Law of Contract-II Law of Tort
M4	Corporate Law Intellectual Property Law Cyber Law
M5	Environmental Law Human Right law



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## **BUSINESS STUDIES/MANAGEMENT**

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Module	Content
<b>Management</b>	Concept, Nature, Importance; Management levels: their Roles and Skills, Social Responsibility of Managers and Ethics in Managing. Evolution of Management: Early contributions; The Classical School: Scientific Management approach and Administrative Management approach. The Behavioural School: The Hawthorne Experiments. The Management Science School. Modern Approaches: Systems Approach, and Contingency approach. Comparative Management Planning: Nature and Significance of Planning, Types of Planning, Process of Planning, Management by Objective (MBO). Organizing: Nature and Significance: Departmentation, Line and Staff Relationship, Span of Control, Authority and Responsibility, Delegation and Decentralization. Staffing: Concept and Significance, Elements of Staffing, Issues in Managing Human Resources. Directing: Concept and Significance. Theories of Motivation, Leadership: Process and Models of Leadership Development, Contemporary views on Leadership: Transformational-Transactional, Charismatic-Visionary leadership.
<b>Strategic Management</b>	Understanding Strategy, Strategic Management, Strategic Intent: Vision; Mission; Business Definition; Goals and Objectives, Environmental Analysis, core competence, value chain analysis, distinctive competency, competitive advantage, Michael Porter 5 force Model, Corporate Appraisal, Corporate Portfolio Analysis Model, McKinsey's 7s Framework. Corporate and Business Level Strategies, Issues related to Strategy Implementation.
<b>Human Resource Management</b>	Concept, Importance and Functions, Human Resource Planning, Compensation Management, Performance Management, Human Resource Audit, International HRM, Strategic HRM, Leadership Development, Work-life Balance, 360 degree feedback, HR scorecard, Talent Management, Transactional Analysis, Competency Mapping, Quality Circle, Empowerment. Human Resources Management in a changing environment; Corporate objectives and Human Resource Planning; Career and succession planning; job analysis; Methods of manpower search; Attracting, Selecting and retaining human resources; Induction and socialization; Manpower training and development; Performance appraisal and potential evaluation; Job evaluation and compensation; Employee welfare; Industrial relations
<b>Organizational Behaviour</b>	Challenges and Opportunities for Organizational Behavior, Personality, Learning, Attitudes, Perception, Values, Team Building, Power and Politics, Organizational Dynamics, Change Management trade unions; Dispute resolution & grievance management, Employee empowerment.



<b>Evolution of management thought</b>	Systems and contingency approach for understanding organizations; Managerial processes, functions, skills and roles in an organization; Social Responsibility of Business; Understanding and Managing individual behavior; Personality; Perceptions; Attitudes; Learning; Decision-making; Management by Objectives; Understanding and managing group processes- interpersonal and group dynamics; Applications of Emotional Intelligence in organizations. Leadership and influence process; Work Motivation. Understanding and Managing organizational system—Organizational design and structure, Work stress, Organizational Change and development; Conflict Management; Stress Management.
<b>Marketing Management</b>	Marketing, Marketing Mix, Marketing segmentation, Marketing in a developing economy. Consumer Behavior, Consumerism, Economic, Social and psychological Determinants of Consumer Behavior, Contemporary retailing scene in India and marketing challenges, Services Marketing, Rural Marketing, E-Marketing, Green Marketing, Customer relationship marketing, Viral Marketing, Network Marketing, Managing logistics and supply chain.
<b>Operational Management</b>	Operations management in corporate profitability and competitiveness, Material Management, Purchase Management, Store Management, Safety Management. Quality Improvement: TQM, Six Sigma, JIT Approach, Lean Production System and Kanban System. Supply Chain Management, Supply Chain Strategy and Performance Measures, Linking Supply Chain and Business Performance, Inventory Management, Transportation Management, Supply Chain Management Application Marketplace and Future Trends.
<b>Business Legislations</b>	Formation, Memorandum and Articles of Association, prospectus Allotment of Shares, Share and Share Capital, Membership, Borrowing Powers, Management and Meetings, Accounts and Audit, Prevention of Oppression and Mismanagement, Winding up.; An Overview of Consumer Protection Act and Cyber Laws).
<b>Financial management</b>	Objectives of financial management; Time value of money, sources of finance, Investment decisions: Importance, Difficulties determining cash flows, methods of capital budgeting Risk analysis : Cost of capital; Concept and importance, Computations of cost of various sources of finance; Weighted Average Cost of Capital; Capital Structure decisions; Theories of capital structure, Factors determining capital structure. Optimum capital structure; Management of working capital - Cash, Receivables and Inventory Management, Internal Financing and Dividend Policy; Financial Modelling.
<b>Business Communication &amp; Ethics</b>	Importance and nature of business communication, Effective communication skills; Process of 3 communication Oral and Non-Verbal communication, Barriers and gateways in communication and Do's and Don't of business writing, Commercial letters; Writing business and academic reports; Public speaking, listening and Negotiations; conducting and attending interview and meetings. Concept of Business Ethics - Values – Concepts, Types and Formation of Values, Ethics and Behavior, Values of Indian Managers; Managerial Excellence through Human Values



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## **SCHOOL OF PHARMACEUTICAL SCIENCES**

**SESSION: 2025-2026**

### **PHARMACEUTICS**

Module	Content
<b>Biopharmaceutics and Pharmacokinetics</b>	Compartment modelling, physiological models, one compartment open model drug disposition, plasma elimination half-life, two compartment open model drug disposition. Drug Distribution-Apparent volume of distribution (one and two compartment models). Nonlinear Pharmacokinetics.
<b>Basics of Formulations</b>	Dosage form and its types, Powder, solution, suspension, emulsion, identification test for emulsion, theories of emulsification, Suppositories and its bases, Gaseous dosages forms -Aerosol, propellant with example.
<b>Bioavailability and Bioequivalence</b>	Measurement of bioavailability, in vitro drug dissolution testing models, Invitro-in Vivo correlation. <b>Bioequivalence</b> -General principles, criteria for establishing bioequivalence requirement, criteria for waiver of evidence for bioequivalence requirement and methodology. Pharmacokinetics parameters- logarithmic transformations. Multiple dosage regimens-drugs accumulation, i.e. and oral regiment, loading dosing, scheduling. Diseases-dose adjustment – hepatic disease dose adjustment, renal disease dose adjustment, therapeutic drug monitoring.
<b>Novel Drug Delivery System</b>	Potential application of nanocarriers in Targeted Drug Delivery, oral osmotic pumps, Fundamental of bio adhesion, naturally occurring bio adhesives, mucoadhesive polymers used in oral cavity, Multiple emulsion, colon specific drug delivery system, implant and inserts, Resealed erythrocytes. Organogel, Niosomes.
<b>Industrial Pharmacy and Drug Regulatory Affairs</b>	Preformulation studies, Tablet, Coating of tablets, Liquid orals, Capsules, Pellets, Parenteral Products, cosmetics, Packaging material science. Approval process and timelines involved in IND, NDA, ANDA. Changes to an approved NDA/ANDA. Overview of regulatory authorities of India and US.



# PHARMACEUTICAL CHEMISTRY

Module	Content
<b>Molecular modeling</b>	Molecular mechanics quantum mechanism, docking, a d v a n c e d concepts of molecular modeling.
<b>Structural Elucidation of Drugs</b>	Structural elucidation of natural, synthetic and semisynthetic drugs by using spectroscopic data. [UV, IR, H1NMR, C13 NMR, Mass].
<b>Reactions and their Mechanisms</b>	Generation, Stability, structure and reactivity of free radicals, Carbocations and Carbiners. Mechanism of free radical, electrophilic, Nucleophilic (Addition and substitution) reactions, elimination reactions with examples.
<b>Molecular Actions</b>	Concept of receptors and receptor theories. The role of functional groups in drug receptors, interactions with specific reference to opioid, dopaminergic, adrenergic, cholinergic and GABAnergic receptors.
<b>New drug development and lead approach</b>	Identification of lead molecule for natural products. Lead optimization for the new drug development with suitable examples from CVS, CNS and chemotherapeutic agents.
<b>Drug Design</b>	History and development of QSAR, physicochemical parameters. Hansch analysis, free klison analysis.
<b>Instrumental Methods of Analysis</b>	<p><b>UV-Visible spectroscopy:</b> Introduction, Beers law and its limitations, molar extinction coefficient, Woodward's Fiesher rules for calculating absorption maximum, instrumentation and applications.</p> <p><b>FTIR Spectroscopy:</b> Principles-molecular vibrations, vibrational frequency and its influencing factors, sampling techniques, instrumentation and applications of FTIR.</p> <p><b>NMR Spectroscopy:</b> Principle, chemical shifts, shielding and deshielding effects, splitting of signals, computing constants, instrumentations and applications (H- &amp; C-NMR).</p> <p><b>Mass-spectroscopy:</b> Principle, ionization Techniques, Fragmentation pattern, instrumentation and applications.</p> <p><b>GLC and HPLC:</b> Principles, instrumentation with special emphasis on different column and detectors and applications.</p> <p><b>HPTLC, Ion-exchange Chromatography and Gel filtration:</b> Principle, instrumentation and applications.</p> <p><b>Potentiometry and conductometry:</b> Principle, instrumentation and applications.</p> <p><b>Polarimetry, fluorimetry and refractometry:</b> Principle, instrumentation and applications with suitable examples.</p>

# PHARMACOGNOSY

Module	Content
<b>Indian Systems of Medicine</b>	Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy. Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.
<b>Extraction</b>	General methods and Principles of extraction methods, types of extraction and their merits and demerits for crude drugs; selection and purification of solvents for extraction; screening of the plant extracts for chemicals. General methods of isolation of different classes of phytochemical.
<b>Herbal Cosmetics</b>	Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skincare, hair care and oral hygiene products. Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.
<b>Screening and evaluation</b>	Screening of plant extracts / phytochemicals for analgesic, anti- inflammatory, anti-diabetic, diuretic, anti-fertility, anti-epileptic, hepatoprotective, immunomodulatory, anticancer cardiovascular and antimicrobial activity.
<b>Patenting and Regulatory requirements of natural products</b>	Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy. Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.
<b>Regulatory Issues.</b>	Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.
<b>Tissue Culture</b>	Current trends in tissue culture and its applications in pharmaceutical and allied fields. Immobilized cell systems and techniques of immobilization, biotransformation resulting into pharmaceutically important secondary metabolites, using tissue cultures. Micro propagation, Hairy-root cultures and their applications in pharmacy.

# PHARMACOLOGY

Module	Content
<b>Basic concept of Pharmacokinetic</b>	Processes involved in transportation of drug across cell membrane. Absorption, distribution, metabolism and excretion of drugs. Basic concepts of clinical pharmacokinetics: i) Bioavailability & bioequivalence ii) volume of distribution iii) half-life iv) clearance.
<b>Pharmacodynamic</b>	Site and mechanisms of drug action, factors modifying drug action. Classification and families of receptors, regulation of receptors, drug receptor interaction theories, dose response curve and therapeutic Index.
<b>Adverse Drug Reactions:</b>	Types and mechanisms
<b>Pharmacology of CNS and ANS acting drugs</b>	Neurohumoral transmission, parasympathomimetics, parasympatholytics, sympathomimetics, sympatholytics, general anesthetics, sedatives, hypnotics and centrally acting muscle relaxants, anti-epileptics, antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.
<b>Chemotherapy</b>	General principles of chemotherapy, sulfonamides and cotrimoxazole, antibiotics (Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolones, tetracycline and aminoglycosides), antitubercular agents, antileprotic agents, antifungal agents, antiviral drugs, antimalarial drugs and chemotherapy of malignancy.
<b>Cardiovascular pharmacology</b>	Cardiotonics, antiarrhythmics, antihypertensive, antianginal and antihyperlipidemic agents.
<b>Endocrine Pharmacology</b>	Anterior pituitary hormones, thyroid hormones, hormones regulating plasma calcium level, ACTH and corticosteroids, insulin, oral hypoglycemic agents and glucagon.



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## **SCHOOL OF LIBERAL ARTS**

### **Unit I**

#### **Foundations of Western and Indian Philosophy**

Ancient Western Philosophy: Socrates, Plato, Aristotle

Modern Philosophy: Descartes, Kant, Hegel

Indian Philosophy: Upanishads, Buddhism, Jainism, Vedanta

### **Unit II**

#### **Major Thinkers and Social Theories**

Renaissance and Enlightenment Thinkers: Machiavelli, Rousseau, Hobbes, J.S. Mill

Karl Marx and Historical Materialism

Sigmund Freud and Psychoanalysis

B.R. Ambedkar, Rabindranath Tagore, Amartya Sen

### **Unit III**

#### **Literary, Cultural and Critical Theories**

Structuralism: Saussure, Lévi-Strauss

Post-Structuralism: Foucault, Derrida

Feminist Theory: Simone de Beauvoir, Judith Butler

Postcolonial Theory: Edward Said, Gayatri Spivak

Reader-Response and New Criticism

### **Unit IV**

#### **Contemporary Issues**

NEP 2020, NITI Aayog, and Sustainable Development Goals (SDGs)

Globalization, Digital Culture, Climate Change

### **Unit V**

#### **Research Methodology**

Introduction, Research Problem, Hypothesis, Sampling, Methods of Data Collection, Research Approach-qualitative, quantitative and mix

Academic Writing-Nuances of Research Paper Writing, References & bibliography