Ph.D. Entrance Test (SGU-PET)
Syllabus

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Ph.D. Entrance Test (SGUPET) Syllabus
Section – I: Research Methodology (50% Weightage)
(Common to All Programs)

Chapter	Content
Chapter 1	Fundamentals of Research, Aims and objectives of research, Types of research – basic, novel and applied research. Tools for searching research topic – books, journals, internet, discussions etc. Research hypothesis, Steps in research design, Research process, Literature review
Chapter 2	Research Aptitude Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics. Ethics in research – plagiarism
Chapter 3	Research methods a) Formulating a research problem, features of good research designs, scientific, developing a research plan b) Methods: Experiments, surveys, Questionnaires, Interviews, Telephone Surveys, mail surveys, Case Studies, Participant and non-participant observation, observational trials c) Sampling design: Census and sample surveys, implication of sample design, types of sample design d) Method of sample collection: Collection of primary data, Collection of Secondary data, Sampling distribution, Validation of data e) Processing and analysis of data: Statistics in research, Measures of central tendency, measures of dispersion, measures of asymmetry, Simple regression analysis, use of computers in research, Hypothesis testing, Chi-square test, Students 't test, ANOVA test f) Interpretation and report writing: preparation of tables and graphs, Observation writing and its interpretation, Report format
Chapter 4	Research methods a) Laboratory experiments, field trials, use of instruments, observations b) Interviews, Questionnaire surveys, Telephone survey, mail Survey, Postal survey, and checklists. Design of experiments.
Chapter 5	Report writing, contents of research report, Intellectual property rights and patenting. Patent registration, patent search, process of patenting.
References:	1. Research Methodology: The aims, Practices and ethics of science by Peter Pruzan- Springer 2. Principles and Techniques of Biochemistry and molecular Biology by Keith Wilson and John Wolker **3.** Research Methodology methods and Techniques (second revised edition) by C. R. Kothari, New Age Publishers.

Section – II: Aerospace Engineering (Weightage 50%)

Chapter	Content
Chapter1	**Aerodynamics** Fluid properties and kinematics, Control volume analysis, continuity, momentum, and energy equations, Potential flow, incompressible flow, and boundary layer theory, Navier–Stokes equations and laminar/turbulent flow concepts, Dimensional analysis and similarity.. Inviscid incompressible flow over airfoils and wings.-Compressible flow: Isentropic flow, shock waves, expansion fans.-Subsonic, transonic, supersonic, and hypersonic aerodynamics.-Computational Aerodynamics (basics of CFD).-Wind tunnel testing principles
Chapter2	**Aircraft Structures** Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress–Strain Diagram for structural steel and non-ferrous materials, Principle of superposition, Total elongation of tapering bars of circular and rectangular cross sections, volumetric strain, expression for volumetric strain, Elastic constants, Relationships among elastic constants, Stresses in composite bars, Thermal stresses in simple and compound bars. Types of beams, loadings and supports, shearing force, bending moment Stress and strain analysis. ,Buckling of columns and panels, Structural dynamics and vibration analysis, Composite materials and failure theories, Finite Element Method (basic concepts).
Chapter3	**Propulsion** Thermodynamics of propulsion systems, Gas turbine engines: compressors, turbines, and combustors, Rocket propulsion: performance parameters, nozzle flow, thrust equation, Propeller theory and piston engines (basics),Advanced propulsion: ramjets, scramjets, electric propulsion (overview).
Chapter4	**Flight Mechanics** Fundamentals of aircraft performance: thrust, drag, lift, weight balance, Climb, glide, cruise, and turning performance, Static stability and control (longitudinal, lateral, directional), Dynamic stability and handling qualities, Introduction to flight testing.
Chapter5	**Materials and Manufacturing for Aerospace.** Metallic and composite materials — properties and selection, Heat treatment and corrosion, Manufacturing techniques: casting, forging, machining, additive manufacturing, Non-destructive testing and quality control, Smart materials and emerging aerospace materials.
Chapter6	**Space Dynamics (Orbital Mechanics)** Newton's law of gravitation and two-body problem, Orbital elements, transfer orbits, Hofmann transfers, Orbital perturbations and re-entry mechanics, Satellite attitude dynamics and control basics, Launch vehicles and mission design overview.

References:	• F. M. White, *Fluid Mechanics*, 9th ed., McGraw-Hill Education, 2020 • J. D. Anderson Jr., *Fundamentals of Aerodynamics*, 6th ed., McGraw-Hill Education, 2017. • J. D. Anderson Jr., *Introduction to Flight*, 8th ed., McGraw-Hill Education, 2016. • G. P. Sutton and O. Biblarz, *Rocket Propulsion Elements*, 9th ed., John Wiley & Sons, 2016. • H. I. H. Saravanamuttoo, G. F. C. Rogers, H. Cohen, and P. V. Straznicky, *Gas Turbine Theory*, 7th ed., Pearson Education, 2017. • V. Ganesan, *Gas Turbines*, McGraw-Hill Education, 2017. • T. H. G. Megson, *Aircraft Structures for Engineering Students*, 7th ed., Butterworth-Heinemann,2021. • B. W. McCormick, *Aerodynamics, Aeronautics, and Flight Mechanics*, 2nd ed., Wiley India, 1995. • H. D. Curtis, *Orbital Mechanics for Engineering Students*, 4th ed., Butterworth-Heinemann, 2020. • W. E. Wiesel, *Spaceflight Dynamics*, 2nd ed., McGraw-Hill, 1989. H. Kaplan, *Modern Spacecraft Dynamics and Control*, Wiley, 1976. • M. F. Ashby and D. R. H. Jones, *Engineering Materials 1 & 2*, 5th ed., Butterworth-Heinemann, 2018.

Section – II: Computer Science & Engineering (Weightage 50%)

Chapter	Content
Chapter 1	**Theory of Computation:** Mathematical notions and terminology of sets, sequences and tuples, functions and relations, graphs, strings and languages. Boolean logic properties and representation. Automata Theory (DFA, NFA, Regular Expressions),Context-Free Grammars and Pushdown Automata, Turing Machines and Decidability, Computational Complexity (P, NP, NP-Completeness)
Chapter 2	**Data Structures and Algorithms:** Data Structures: Arrays, Linked Lists, Stacks, Queues, Trees, Graphs, Algorithm Analysis: Time and Space Complexity, Searching and Sorting Algorithms, Greedy, Divide and Conquer, and Dynamic Programming, Hashing, Graph Algorithms (DFS, BFS, Shortest Path, Minimum Spanning Tree)
Chapter 3	**Computer Organization and Architecture:** Digital Logic (Logic Gates, Flip-Flops, Counters, Multiplexers), Data Representation and Number Systems, Processor Architecture: Instruction Set and addressing modes, CPU Organization, Control Unit, Memory Hierarchy: Cache, Main Memory, and Storage Pipelining, Parallelism, RISC vs CISC Architectures.

Chapter 4	**Operating System and Distributed computing systems:** Processes, threads, inter-process communication, concurrency, and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems. Distributed computing system: Design issues of Distributed operating system. Distributed computing environment. Message Passing: Features of a good Message Passing System. Issues in IPC by Message Passing Synchronization, Bullering, and Multidatagram Messages, RPC Model, Implementing RPC Mechanism. Distributed Shared Memory: General Architecture of DSM systems. Design and implementation Issues of DSM, Granularity, Structure of Shared Memory Space. Consistency models, Replacement strategy, Thrashing.
Chapter 5	**Advanced Database Concepts:** Database Design and ER Model, Relational Algebra and SQL, Normalization and Indexing, Transaction Management and Concurrency Control. Distributed database management system: Features of DDS, Distribution transparency, DDB design, Query translation, Optimization. Distributed Transaction, Parallel Databases: I/O parallelism, Inter-query and Intra query parallelism, Intra operation and Interoperation parallelism. Object database management system: Overview, Complex Data types, Structured data types, Encapsulation Inheritance, Arrays and Multiset types in SQL, Object OIDs and reference types, ORDBMS, Object Query Language.
Chapter 6	**Computer Networks and Security:** LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.
Chapter 7	**Software Engineering:** System Development Life Cycle (SDLC): Steps, Water fall model, Prototypes, Spiral model. Software Metrics: Software Project Management. Software Design: System design, detailed design, function oriented design, object oriented design, user interface design. Design level metrics. Coding and testing: Testing level metrics, Software quality and reliability, Clean room Approach, software reengineering.
Chapter 8	**Programming Language Processors:** Compiler, Interpreter, assembler, Linker, Loader, Macro processors, phases of compilers, Lexical analysis, parsing, Top-down parsing and bottom up parsing, syntax directed translation, runtime environment, Symbol table, type checking, intermediate Code generation, Code optimization, code generation.
Chapter 9	**Programming Languages:** Basics of C, C++, and Java, Scripting Languages: Python, Object-Oriented Programming Concepts, Functional and Logic Programming Concepts.

Chapter 10	**Advanced Technologies :** Artificial Intelligence and Machine Learning: Search Algorithms (A*, BFS, DFS), Knowledge Representation (Logic, Semantic Networks), Basics of Machine Learning: Supervised and Unsupervised Learning, Common Algorithms (Linear Regression, Decision Trees, K-Means Clustering) Neural Networks and Deep Learning Basics fundamentals.
References:	1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002. 2. Michael Sipser, Introduction to the Theory of Computation, Cengage Learning, 3rd Edition, 2012 3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009. 4. Michael T. Goodrich and Roberto Tamassia, Algorithm Design and Applications, Wiley, 1st Edition, 2014. 5. John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann, 5th Edition, 2011. 6. Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, Pearson Education, 6th Edition, 2012. 7. Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Operating System Concepts, Wiley, 10th Edition, 2018. 8. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson Education, 2nd Edition, 2006. 9. Abraham Silberschatz, Henry Korth, and S. Sudarshan, "Database System Concepts", 6th Ed., McGraw- Hill,2010. 10. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7th Edition, 2016. 11. Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, Pearson Education, 5th Edition, 2010. 12. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, 6th Edition, 2017. 13. Ian Sommerville, Software Engineering, Pearson Education, 10th Edition, 2015. 14. Roger S. Pressman and Bruce R. Maxim, Software Engineering: A Practitioner's Approach, McGraw-Hill Education, 9th Edition, 2014. 15. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques, and Tools (Dragon Book), Pearson, 2nd Edition, 2006. 16. Andrew W. Appel, Modern Compiler Implementation in C/Java/ML, Cambridge University Press, 2nd Edition, 2002. 17. Peter Van Roy, Seif Haridi, Concepts, Techniques, and Models of Computer Programming, MIT Press, 2nd Edition, 2004. 18. Luciano Ramalho, Fluent Python: Clear, Concise, and Effective Programming, O'Reilly Media, 2nd Edition, 2021 19. Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 4th Edition, 2020. 20. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 1st Edition, 2016.

Section – II: Civil Engineering (Weightage 50%)

Chapter	Content
Chapter1	**Strength of materials** Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress–Strain Diagram for structural steel and non ferrous materials, Principle of superposition, Total elongation of tapering bars of circular and rectangular cross sections, volumetric strain, expression for volumetric strain, Elastic constants, Relationships among elastic constants, Stresses in composite bars, Thermal stresses in simple and compound bars. Types of beams, loadings and supports, Shearing force, bending moment
Chapter2	**Fluid mechanics** Definition of Fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension, & capillarity. Newton's law of viscosity. Capillary rise in a vertical tube and between two plane surfaces Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure. Vapor pressure. Measurement of pressure using simple, differential & inclined Manometers. Introduction to Mechanical and electronic pressure measuring devices.
Chapter3	**Environmental Engineering** Systems of water supply, Objectives of water quality management, Water quality parameters – Physical, chemical and Microbiological, Sampling, Water quality analysis (IS: 3025 and IS: 1622), Drinking water standards BIS & WHO guidelines. Health significance of Fluoride, Nitrates and heavy metals like Mercury, Cadmium, Arsenic etc and toxic / trace organics, waterborne diseases, Objectives of Water Treatment, Flow chart of treatment units, Aeration Principles, types; Sedimentation- theory, types
Chapter4	**Geotechnical Engineering** Formation of soil–types of soil–clay mineralogy and soil structure: Soil-Water system, Electrical diffuse double layer, adsorbed water, base-exchange capacity, Common clay minerals in soil and their structures- Index Properties- Three phase system of soil and their relationships – Grain size analysis –Stoke's law and hydrometer analysis – Consistency of soils –Determination of consistency indices – Classification of coarse grained and fine grained soil as per BIS.
Chapter5	**Transportation Engineering** Importance of transportation, comparison of various modes of transportation, importance and scope of highway engineering, highway planning and alignment, importance of highway geometric design and scope of traffic engineering,principlesofurbantransportation,masstransitfacilities,

	Integration of different modes of transportation
Chapter6	**Project Management** Optimization Techniques, Concrete Technology, Construction Materials, Linear and non linear programming Techniques, Legal Aspects in Construction Industry. Project planning and Control, Project cost control
References:	1. R.C.Hibbeler,MechanicsofMaterials,8thEdition,PrenticeHall,2011 2. P.N.Modi and S.M.Seth, Hydraulics and Fluid Mechanics,: Standard Book House, 2010. 3. Geotechnical Earthquake Engineering, S.L.Kramer, Pearson Publication. 4. Hira Gupta,Operations Research, S.Chand Publications,2010. 5. S.K.Garg, Water Supply Engineering, Khanna Publications, 2010 6. B.C.Punmia, Waste Water Engineering, Laxmi Publications, 2011. 7. S.Timoshenko, Strength of Materials, Part–I, D.Van Nostr and Company,Newyork. 8. Chitkara K.K.,Construction Project Management,Tata Mcgraw Hill Education Pvt. Ltd. 9. Kadiyali L.R.,Transportation Engineering, Khanna Publishing Co.

Section – II: Electronics Engineering (Weightage 50%)

Chapter	Content
Chapter 1	**Networks** Network graphs: matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices. Solution methods: nodal and mesh analysis. Network theorems: superposition, Thevenin and Norton's maximum power transfer, Wye-Delta transformation. Steady state sinusoidal analysis using phasors. Linear constant coefficient differential equations; time domain analysis of simple RLC circuits, Solution of network equations using Laplace transform: frequency domain analysis of RLC circuits. 2-port network parameters: driving point and transfer functions. State equations for networks
Chapter 2	**Electronic Devices** Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-I-n and avalanche photo diode, Basics of LASERs. Device technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process

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Chapter 3	**Analog Circuits** Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single-and multi-stage, differential and operational, feedback, and power. Frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators; criterion for oscillation; single transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers. Power supplies.
Chapter 4	**Digital Circuits and Microprocessors** Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift registers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor (8085): architecture, programming, memory and I/O interfacing.
Chapter 5	**Signals & Systems** Definitions and properties of Laplace transform, continuous-time and discrete time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform. Sampling theorem, Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems
Chapter 6	**Digital Signal Processing** Review of discrete time signals and systems, system properties, discrete LTI system, impulse response, convolution, system representation by difference equation, natural and forced responses, Review of Fourier transform, DTFT, DTFS and Z-transform, DFT and circular convolution, Basic concepts of IIR and FIR filters
Chapter 7	**Electromagnetics** Elements of vector calculus: divergence and curl; Gauss's and stoke's theorems, Maxwell's equations: differential and integral forms. Wave equation, pointing vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristic impedance; impedance transformation; Smith chart; Impedance matching; Sparameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas: Dipole antennas; radiation pattern; antenna gain.
Chapter 8	**Digital Communication** Sampling theorem, quantization, quantization noise and signal to noise ratio analysis in PCM, DPCM and DM, Baseband transmission, intersymbol interference, Nyquist criterion for zero ISI, wave shaping and correlative coding, Linear equalization, decision feedback equalization, maximum likelihood sequence estimation, Digital modulation techniques-BPSK, FSK, QPSK, MSK, matched filter receiver and probability of error analysis in BPSK, FSK and QPSK.

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Chapter 9	**Control Systems** Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral Derivative (PID) control. State variable representation and solution of state equation of LTI control systems**.**
References	1. Network Analysis & Synthesis, Ghosh, 1E, TMH, 2010. 2. Networks and Systems, D Roy Choudhury, New Age Publication, 2008. 3. Millman's Electronic Devices & Circuits, SIE 4th Edition, Millman & Halkias, McGraw-Hill Education,2015 4. Semiconductor Physics And Devices by Donald A. Neamen 5. Elements of Electromagnetics by Matthew N.O. Sadiku, 6. Electromagnetic waves and Radiating Systems by Jordon and Ballmain, Antenna Theory by Balanis 7. Digital Logic and Computer Design by M.Morris Mano 8. Analog and Digital Communication System by Simon Haykin 9. Principle of Communication System by Taub & Schillings 10. Modern digital and analog Communications system by BP Lathi 11. Analog Electronics, Electronics devices and circuits – Donald A Neaman, 12. Microelectronics Circuits by Sedra & Smith 13. Electronic Devices and Circuit Theory by Robert L Boylestad & Nashelsky 14. Control Systems Engineering by Normam Nise 15. Control Systems by Nagarath and Gopal 16. Signals & Systems By Alan V. Oppenheim Digital Signal Processing by S.K Mitra

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Section – II: Management (50% Weightage)

Chapter	Content
Chapter 1	**Introduction to Business Administration** Managerial Economics -Demand analysis-Production Functions-Cost-output relations - Market Structures-Pricing theories-Advertising-Macro-economics National Income Concepts-Infrastructure-management and Policy-Business Environment-Capital Budgeting.
Chapter 2	**Theories & Schools of Thoughts** The concept and significance of organizational behavior-skills & roles in an organization-classical, Neo-classical and modern theories of organizational structure-Organizational design-Understanding and managing individual behaviour, Personality-Perception-Values-Attitudes-Learning-Motivation. Understanding & managing group behavior, Process-Inter- personal & group dynamics-Communication-Leadership-Managing Change-Managing Conflicts.
Chapter 3	**Human Resource Management** Concepts & perspectives in HRM: HRM in changing environment, Human resource planning-Objectives, Process &Techniques-Job analysis- job description- Selecting Human Resources-Induction, Training & Development-Exit policy & Implications-Performance Appraisal & Evaluation-Potential Assessment-Job Evaluation-Wage Determination-Industrial Relations & Trade Unions-Dispute Resolutions & Grievance Management – Labour Welfare & Social Security Measures.
Chapter 4	**Financial Management** Financial management-Nature & scope – Valuation concepts & Valuation of securities – Capital budgeting decisions – Risk analysis – Capital structure & cost of Capital – Dividend policy – Determinants – long- term & short term financing instruments – Mergers & Acquisitions.
Chapter 5	**Marketing Management** Marketing Environment & Environment scanning: Marketing Information systems & Marketing Research: Understanding Consumer & Industrial markets: Demand Measurement & Forecasting: Market segmentation – Targeting & positioning: Product decisions, Product mix, Product life cycle: New product development: Branding & packaging: Pricing methods & strategies. Promotion decisions – Promotion mix: Advertising: Personal selling: Channel management: Vertical marketing systems: Evaluation & control of marketing effort: Marketing of services: Customer relation management: Uses of internet as a marketing medium – other related issues like branding, market development, Advertising & Retailing on the net. New issues in Marketing, Advertisement, Social Media.

Chapter 6	**Production Management** Role & scope of production management: Facility location: Layout planning & analysis: Production planning & control – Production process analysis: Demand forecasting for Operations; Determinants of product mix: Production scheduling: Work measurement: Time & Motion study: Statistical Quality Control. Role & scope of Operations Research: Linear programming: Sensitivity analysis: Duality: Transportation model: Inventory control: Queuing theory: Decision theory: Markov analysis PERT/CPM.
Chapter 7	**Operation Research** Probability theory: Probability distributions – Binomial, Poisson, Normal & Exponential; Correlation & regression analysis; Sampling theory; sampling distributions; Tests of Hypothesis; large & small samples; t, z, f, Chi-square tests.
Chapter 8	**IT and Systems** Use of Computers in Managerial applications; Technology issues and Data processing in organization; Information Systems; MIS & Decision making; System analysis & design; Trends in Information Technology; Internet & Internet based applications.
Chapter 9	**Strategic Management** Concept of corporate strategy; Components of strategy formulations; Ansoff's growth vector; BCG Model; Porter generic strategies; Competitor analysis; Strategic dimensions and group mapping: Industry analysis; Strategy in Industry evolution, fragmentation, maturity and decline; Competitive Strategy & Corporate Strategy; Trans nationalization of world economy; Managing cultural diversity; Global entry strategies; Globalization of financial system & services; Managing International business; Competitive advantage of national; RTP & WTO.
Chapter 10	**International Business** India's Foreign Trade & policy; Export Promotion policies; Trade agreements with other countries; Policy & performance of export Zones & Export Oriented Units; Exports incentives. International marketing logistics; International logistical structures; Export Documentation frame-work; Organization of shipping services; Chartering practices; Marine cargo insurance. International financial environment; Foreign exchange markets; Determination of exchange rates; Exchange risk measurement; International investment; International capital markets; International Credit Rating agencies & Implication of their ratings. WTO & Multilateral trade agreements pertaining to trade in goods: Trade in services & TRIPS; Multilateral Environmental Agreements (MEAs); International Trade Blocks- NAFTA, ASEAN, SAARC, EU, WTO & Dispute settlement Mechanism. Technology monitoring; Emerging opportunities for global business.

References:	1. Managerial Economics –D M Mithani, 5/e, Himalaya Publication. 2011. 2. Managerial Economics – D N Dwivedi, 7/e, Vikas Publication. 2008 3. Essentials of Management-Koontz, 8/e, McGraw Hill 4. Fred Luthans - 'Organisational Behavior', McGraw Hill Publishing Company, New York, 2011. 5. Human Resource Management by Gary Dessler 6. Financial Management - Khan M. Y.& Jain P. K, 6/e, TMH, 2011. 7. Financial Management - Prasanna Chandra, 8/e, TMH, 2011. 8. Marketing Management: A South Asian Perspective – Philip Kotler, Kevin Lane Keller, Abraham Koshy, MithileshwarJha, 14/e, Pearson 9. Production and Operations Management: Prof. K. Ashwathappa, K Sridhar Bhat, Himalaya Publications 10. Strategic Management: An Integrated Approach - Charles W. L. Hill, Gareth R. Jones, Cengage Learning. 11. Business Policy and Strategic Management – SubbaRao P, HPH. 12. Aswathappa, INTERNATIONAL BUSINESS, Tata Mc Graw Hill publications, New Delhi 13. Operations Research: An Introduction by HamdyTaha, Pearson 14. Operations Research by H N Wagner, Prentice hall. 15. Optimization in Operations Research by Ronald Rardin, Pearson Education Inc. 16. Operations Research by R. Paneerselvam, Prentice Hall of India Pvt. Ltd. **17.** Quantitative Techniques in Management by N D Vohra, McGraw-Hill 18. Information Technology Management By Raner ,Potter and Turban. 19. IT for Management- Making connections for strategic advantage- Turban, McLean and Wetherbe 20. Managerial Economics – D N Dwivedi, 7/e, Vikas Publication. 2008 21. Essentials of Management-Koontz, 8/e, McGraw Hill 22. Fred Luthans - 'Organisational Behavior', McGraw Hill Publishing Company, New York, 2011. 23. Human Resource Management by Gary Dessler 24. Financial Management - Khan M. Y.& Jain P. K, 6/e, TMH, 2011. 25. Financial Management - Prasanna Chandra, 8/e, TMH, 2011. 27. Marketing Management: A South Asian Perspective – Philip. Kotler, Kevin Lane Keller, Abraham Koshy, MithileshwarJha, 14/e, Pearson Production and Operations Management: Prof. K. Ashwathappa, K Sridhar Bhat, Himalaya Publications 28. Strategic Management: An Integrated Approach - Charles W. L. Hill, Gareth R. Jones, Cengage Learning. 29. Business Policy and Strategic Management – SubbaRao P, HPH. 30. Aswathappa, INTERNATIONAL BUSINESS, Tata Mc Graw Hill publications, New Delhi

	31. Operations Research: An Introduction by HamdyTaha, Pearson 32. Operations Research by H N Wagner, Prentice hall. 33. Optimization in Operations Research by Ronald Rardin, Pearson Education Inc. 34. Operations Research by R. Paneerselvam, Prentice Hall of India Pvt. Ltd. 35. Quantitative Techniques in Management by N D Vohra, McGraw-Hill 36. Information Technology Management By Raner ,Potter and Turban. 37. IT for Management- Making connections for strategic advantage- Turban, McLean and Wetherbe

Section – II: Physics (50% Weightage)

Chapter	Content
Chapter 1	**Mathematical Methods of Physics** Vector algebra and vector calculus; Linear algebra, matrices, Cayley Hamilton theorem, eigenvalue problems; Linear differential equations; Special functions (Hermite, Bessel, Laguerre and Legendre); Fourier series, Fourier transform and Laplace transform; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals; Elementary ideas about tensors; group theory numerical methods, probability.
Chapter 2	**Classical Mechanics** Newton's laws; Phase space dynamics, stability analysis; Central-force motion; Two-body collisions, scattering; Rigid body dynamics, non-inertial frames Variational principle, Lagrangian and Hamiltonian formalisms and equations of motion; Poisson brackets and canonical transformations; cyclic coordinates; Periodic motion, small oscillations and normal modes; Special theory of relativity, Lorentz transformations, relativistic kinematics and mass–energy equivalence.
Chapter 3	**Electromagnetic Theory** Electrostatics: Gauss' Law and its applications; Laplace and Poisson equations, boundary value problems; Magnetostatics: Biot-Savart law, Ampere's theorem, electromagnetic induction; Maxwell's equations in free space and linear

	isotropic media; Scalar and vector potentials; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Reflection and refraction, polarization, Fresnel's Law, interference, coherence, and diffraction; Dispersion relations in plasma; Lorentz invariance of Maxwell's equations; Transmission lines and wave guides; Dynamics of charged particles in static and uniform electromagnetic fields; Radiation from moving charges, dipoles and retarded potentials.
Chapter 4	**Quantum Mechanics** Wave-particle duality; Commutators and Heisenberg's uncertainty principle; Matrix representation; Dirac's bra and ket notation; Schroedinger equation (time-dependent and time-independent); Eigenvalue problems such as particle-in-a-box, harmonic oscillator, etc.; Tunneling through a barrier; Motion in a central potential; Orbital angular momentum, Angular momentum algebra, spin; Addition of angular momenta; Hydrogen atom, spin-orbit coupling, fine structure; Time-independent perturbation theory and applications; Variational method; WKB approximation; Time dependent perturbation theory and Fermi's Golden Rule; Selection rules; Semi-classical theory of radiation; Elementary theory of scattering, phase shifts, partial waves, Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection; Relativistic quantum mechanics: Klein Gordon and Dirac equations.
Chapter 5	**Thermodynamic and Statistical Physics** Laws of thermodynamics and their consequences; Thermodynamic potentials, Maxwell relations; Chemical potential, phase equilibria; Phase space, micro- and macrostates; Microcanonical, canonical and grand-canonical ensembles and partition functions; Free Energy and connection with thermodynamic quantities; First- and second-order phase transitions; Classical and quantum statistics, ideal Fermi and Bose gases; Principle of detailed balance; Blackbody radiation and Planck's distribution law; Bose-Einstein condensation.
Chapter 6	**Electronics** Semiconductor device physics, including diodes, junctions, transistors, field effect devices, homo and heterojunction devices, device structure, device characteristics, frequency dependence and applications; Optoelectronic devices, including solar cells, photodetectors, and LEDs; High-frequency devices, including generators and detectors; Operational amplifiers and their applications; Digital techniques and applications (registers, counters, comparators and similar circuits); A/D and D/A converters; Microprocessor and microcontroller basics.
Chapter 7	**Experimental Techniques and data analysis** Data interpretation and analysis; Precision and accuracy, error analysis, propagation of errors, least squares fitting, linear and nonlinear curve fitting, chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), measurement and control; Signal conditioning and recovery, impedance matching, amplification (Op-amp based,

	instrumentation amp, feedback), filtering and noise reduction, shielding and grounding; Fourier transforms; lock-in detector, box-car integrator, modulation techniques.
Chapter 8	**Atomic & Molecular Physics** Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibrational, electronic, and Raman spectra of diatomic molecules; Frank – Condon principle and selection rules; Spontaneous and stimulated emission, Einstein A & B coefficients, lasers.
Chapter 9	**Condensed Matter Physics** Bravais lattices; Reciprocal lattice, diffraction and the structure factor; Bonding of solids; Elastic properties, phonons, lattice specific heat; Free electron theory and electronic specific heat; Response and relaxation phenomena; Drude model of electrical and thermalconductivity; Hall effect and thermoelectric power; Diamagnetism, paramagnetism, and ferromagnetism; Electron motion in a periodic potential, band theory of metals, insulators and semiconductors; Superconductivity, type–I and type-II uperconductors, Josephson junctions; Defects and dislocations; Ordered phases of matter, translational and orientational order, kinds of liquid crystalline order; Conducting polymers; Quasicrystals.
Chapter 10	**Nuclear and Particle Physics** Basic nuclear properties: size, shape, charge distribution, spin and parity; Binding energy, semi-empirical mass formula; Liquid drop model; Fission and fusion; Nature of the nuclear force, form of nucleon-nucleon potential; Isospin; Deuteron problem; Evidence of shell structure, single- particle shell model, Rotational spectra; Elementary ideas of alpha, beta and gamma decays and their selection rules; Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; Classification of fundamental forces; Elementary particles (quarks, baryons, mesons, leptons); Spin and parity assignments, isospin, strangeness; Gell-Mann-Nishijima formula; C, P, and T invariance and applications of symmetry arguments to particle reactions, parity non-conservation in weak interaction; Relativistic kinematics.
References:	**Mathematical Method of Physics** 1. Mathematical Methods For Physicists, 6th Edition, by Arfken And Weber (Academic Press, 2005). 2. Mathematical Methods for Physics and Engineering, 3rd edition, by Riley K F, Hobson M P and Bence S J, (Cambridge University Press, 2006) 3. Advanced Engineering Mathematics, 10th Edition, byErwinKreyszig, (Wiley & Sons, 2010). 4. Mathematical Physics, RevisedEdition, by H.K. Dass, (S. Chand, 2008).

Classical Mechanics

1. Classical Mechanics, by H Goldstein (Addison Wesley 1980).
2. Classical Mechanics, by N C Rana and P S Joag (Tata McGraw Hill 1991).
3. Introduction to Classical Mechanics, by R G Takwale and P S Puranik (Tata McGraw Hill 1999).
4. Classical Mechanics, by Gupta, Kumar and Sharma (PragatiPrakashan 2000).

Electromagnetic Theory

1. Introduction to Electrodynamics, 4th Edition by David J. Griffiths (Pearson Education, 2014).
2. Foundation of Electrodynamics Theory, 3rd Edition by J.R. Reitz, F.J. Milford and R.W. Christy (Narosa Publication House 1993)
3. Classical Electrodynamics, 2nd Edition by J.D.Jackson (Wiley Eastern)
4. Classical Electrodynamics by S.P. Puri (Tata McGraw Hill, 1990)

Quantum Mechanics

1. Introduction to Quantum Mechanics, 2nd Edition, by David J. Griffiths (Pearson, 2014)
2. Introductory Quantum Mechanics, 4th Edition, by Li boff, (Pearson Education Ltd.).
3. Quantum Mechanics: Concepts and Applications, illustrated, by NouredineZettili (Wiley and Sons, 2009)
4. Quantum Physics, 2nd Edition by H. C. Verma(Surya Publications, 2009).

Thermodynamics and Statistical Physics

1. Statistical and Thermal Physics An Introduction, by S. Loknathan&Gambhir (PHI Learning Pvt. Ltd., 2008)
2. Statistical mechanics, 3rd edition, by R. K. Pathria, (Butterworth-Heinemann publications, 2011).
3. Statistical Mechanics Theory and Applications, by S K Sinha, (Tata McGraw-Hill, 1990).

Electronics & Experimental Methods

1. Electronic Principles, by Malvino (Tata McGraw-Hill Education, 2007).
2. Electronic Devices & Circuits by Millman (Tata McGraw-Hill Education, 2008).
3. Principles of Electronics by V. K. Mehta (S. Chand, 2005).

Atomic & Molecular Physics

1. Fundamentals of molecular spectroscopy, 4th edition, by Colin N.Banwell& Elaine M.McCash, (Tata McGraw –Hill publishing company limited, 2002).
2. Introduction to Atomic Spectra by Harvey Elliot White (McGraw Hill Kogakusha, 1999)

Condensed Matter Physics

1. Introduction to solid state physics, 5th Edition, by C. Kittel, (John Wiley & Sons. Inc., New York 1976).

	2. Solid state physics, by N. W. Ashcroft and N. D. Mermin, (HRW International edition 1976). 3. Solid state physics 2nd Edition, by J. S. Blakemore, (Cambridge University Press 1985). **Nuclear and Particle Physics** 1. Introductory Nuclear Physics, by Krane Kenneth S.(John Wiley & Sons, 2008) 2. Introduction to Elementary Particles, revised, by David Griffiths (John Wiley & Sons, 2008).

Section – II: Chemistry (50% Weightage)

Chapter	Content
Chapter 1	**Physical Chemistry:** Basic principles and applications of quantum mechanics – hydrogen atom, angular momentum. Variational and perturbational methods. Basics of atomic structure, electronic configuration, shapes of orbitals, hydrogen atom spectra. Theoretical treatment of atomic structures and chemical bonding. Chemical applications of group theory. Basic principles and application of spectroscopy – rotational, vibrational, electronic, Raman, ESR, NMR. Chemical thermodynamics. Phase equilibria. Statistical thermodynamics. Chemical equilibria. Electrochemistry – Nernst equation, electrode kinetics, electrical double layer, Debye-Hückel theory. Chemical kinetics – empirical rate laws, Arrhenius equation, theories of reactionrates, determination of reaction mechanisms, experimental techniques for fast reactions. Concepts of catalysis. Polymer chemistry. Molecular weights and their determinations. Kinetics of chain polymerization. Solids - structural classification of binary and ternary compounds, diffraction techniques, bonding, thermal, electrical and magnetic properties Collids and surface phenomena. Data analysis.
Chapter 2	**Inorganic Chemistry** Chemical periodicity. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules. Concepts of acids and bases. Chemistry of the main group elements and their compounds. Allotropy, synthesis, bonding and structure. Chemistry of transition elements and coordination compounds – bonding theories, spectral and magnetic properties, reaction mechanisms. Inner transition elements – spectral and magnetic properties, analytical applications. Organometallic compounds - synthesis,

	bonding and structure, and reactivity. Organometallics in homogenous catalysis. Cages and metal clusters. Analytical chemistry- separation techniques. Spectroscopic electro- and thermoanalytical methods. Bioinorganic chemistry – photosystems, porphyrines, metalloenzymes, oxygentransport, electron- transfer reactions, nitrogen fixation. Physical characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-, NQR, MS, electron spectroscopy and microscopic techniques. Nuclear chemistry – nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.
Chapter 3	**Organic Chemistry** IUPAC nomenclature of organic compounds. Principles of stereochemistry, conformational analysis, isomerism and chirality. Reactive intermediates and organic reaction mechanisms. Concepts of aromaticity. Pericyclic reactions. Named reactions. Transformations and rearrangements. Principles and applications of organic photochemistry. Free radical reactions. Reactions involving nucleophotic carbon intermediates. Oxidation and reduction of functional groups. Common reagents (organic, inorganic and organometallic) in organic synthesis. Chemistry of natural products such as steroids, alkaloids, terpenes, peptides, carbohydrates, nucleic acids and lipids. Selective organic transformations – chemoselectivity, regioselectivity, stereoselectivity, enantioselectivity. Protecting groups.Chemistry of aromatic and aliphatic heterocyclic compounds. Physical characterisation of organic compounds by IR, UV-, MS, and NMR.
Chapter 4	**Interdisciplinary topics** Chemistry in nanoscience and technology. Catalysis and green chemistry. Medicinal chemistry. Supramolecular chemistry. Environmental chemistry.
References:	Physical Chemistry 1. Physical Chemistry – Thomas Engel & Philip Reid. 2. Principles of Physical Chemistry – Puri, Sharma &Pathania. 3. A text book of Physical Chemistry (Vol-II) – K. L. Kapoor. 4. Chemical Kinetics and Catalysis – Richard Mishel. 5. Quantum Chemistry – Donald A. McQuarrie. 6. Fundamentals of Molecular Spectroscopy – Colin N. Banwell. 7. Physical Chemistry – P. W. Atkins. 8. Physical Chemistry – G. M. Barrow. 9. Instrumental Methods of analysis- H.H . Willard, L.L. Mirrit, J.A. Dean. Principal of Instrumental Analysis- D. Skoog and D. West. 10. Instrumental Method – Skoog, Holler & Crouch. Inorganic Chemistry 1. Inorganic Chemistry - J. E. Huheey. 2. Concise Inorganic Chemistry - J. D. Lee. 3. Mechanism of Inorganic Reactions – Fred Basolo, Ralph G. Pearson.

	4. Inorganic Chemistry – Catherine E. Housecraft, Alan G. Sharpe. 5. Inorganic Chemistry – Shriver & Atkins. 6. Advanced Inorganic chemistry– F. A. Cotton, R. G. Wilkinson. 7. Structural Inorganic Chemistry – A. F. Wells. 8. Basic Solid State Chemistry–A. R. West. 9. Atomic Structure and Chemical bonding –ManasChanda. Organic Chemistry 1. Organic Chemistry - Hendrikson, Cram and Hammond. 2. A guide book to mechanism in Organic chemistry- Peter Sykes 3. Mechanism and Structure in Organic chemistry - B. S. Gould. 4. Stereochemistry of Carbon compounds- E.L.Eliel. 5. Organic Chemistry- R. T. Morrison and R. N. Boyd. 6. Advanced Organic Chemistry - J. March. 7. Stereochemistry - P. S. Kalsi. 8. Organic Synthesis the disconnection approach – Stuart Warren. 9. Spectrometric Identification of Org. Compounds – R. M. Silverstein, F. X. Webster. 10. Organic Photochemistry – James H. Coxon, B. Halton. 11. Analytical Chemistry – G. D. Christain.

Section – II: Pharmaceutical Sciences (50% Weightage)

Chapter	Content
Chapter 1	**Pharmaceutics (15% weightage)** **Dosage form Evaluation- Bioavailability:** Rate and extent of bioavailability, assessing bioavailability, multiple dosing – bioavailability, in vitro bioavailability studies (dissolution), Bio equivalence – General principles, criteria for establishing bioequivalence requirement, criteria for waiver of evidence for bioequivalence requirement, methodology, pharmacokinetics parameters – logarithmic transformations. Multiple dosage regimens – drugs accumulation, i.v and oral regiment, loading dosing, scheduling, **Concept & Models for NDDS:** Classification of rate-controlled drug delivery system (DDS), rate programmed release, activation modulated & feedback regulated DDS, Fundamentals of rate-controlled drug delivery – Introduction, mechanistic analysis of controlled release drug delivery, effect of system parameters in controlled drug delivery, evaluation of controlled release drug delivery systems. **Oral drug delivery and delivery systems:** Development of novel drug delivery systems for oral controlled release drug administration, modulation of gastrointestinal transit time, overcome hepatic first pass elimination, Mucosal drug delivery: human mucosa, transmucosal systemic delivery of drugs. **Transdermal Drug Delivery systems:** Skin site for transdermal drug administration, recent developments in transdermal drug delivery, fundamentals

	of skin permeation, technologies for developing transdermal systems, Evaluation of transdermal systems, Particulate drug carriers – liposomes and nanoparticles – Concepts, applications, preparation, and evaluation, in vivo barriers to particulate distribution, selected examples of drug delivery. **Target Oriented Drug Delivery Systems:** Rationale for targeted drug delivery, biological processes and events involved in drug targeting, pharmacokinetics and pharmacodynamic considerations, targeted drug delivery systems, targeting in the gastrointestinal tracts and other mucosal surfaces.
Chapter 2	**Pharmaceutical Chemistry (15% Weightage)** **Structural Elucidation**: Structural Elucidation of some important Natural, Synthetic and Semi synthetic drugs by using spectroscopic data. [UV, IR, H1NMR, C13 NMR, Mass]. **Recent advances:** in the treatment of Diabetes Mellitus, Cardiovascular disease, CNS diseases, Viral, Cancer, Malaria and Tuberculosis. **New drug development and lead approach:** Identification of lead molecule for natural products. Lead optimization for the New drying development with suitable example from CNS, CNS, Chemotherapeutic. Agents. History and development of QSAR. Molecular mechanics quantum mechanism, docking, advanced concepts of molecular modeling.
Chapter 3	**Instrumental Methods of Analysis:** a. UV – Visible spectroscopy: Introduction, Beers law and its limitations, molar extinction coefficient, wood wards Fiesher rules for calculating absorption maximum, instrumentation design and applications. b. IR Spectroscopy: Basic Principles – Molecular vibrations, vibrational frequency and its influencing factors, sampling techniques, instrumentation and applications of FT – IR. c. NMR Spectroscopy: Principle, Chemical shifts, shielding and de-shielding effects, splitting of signals, computing constants, instrumentations and applications (H&CNMR). d. Mass spectroscopy: Principle, Ionization Techniques, Fragmentation pattern, Instrumentation and applications. e. GLC and HPLC: Principles, instrumentation with special emphasis on different column and detectors and applications. **f.** HPTLC, Ion-exchange Chromatography and Gel filtration: Principle, instrumentation and applications.
Chapter 4	**Pharmacology (10% Weightage)** Receptor Pharmacology & Mechanisms: Types of Receptors, theories of receptors, G protein coupled receptors, NMDA receptors, Kinase linked receptors, ion channels, second messengers, DNA linked receptors, signal transduction mechanism, proliferation and apoptosis. Neurohumoral transmission in CNS, ANS and somatic various system a. Molecular basis, underlying mechanism of action of adrenergic, Cholinergic, Dopaminergic, Serotonergie and GABA ergic system. b. Pharmacological actions and possible physiological role of serotonin, Nor-adrenaline, Adrenaline. Acetylcholine and Dopamine. Cardiovascular Pharmacology: Cardiotonic, Antiarrhythmics, Antihypertensive, antianginal & anti hyperlipidemic agents. Organization of screening for the

	pharmacological activity of new substances with emphasis on the evaluation of antihypertensives, Cardiac, Psychopharmacological, analgesic, anti-inflammatory anti diabetic, hepatoprotective, antistress and nootropic agents etc. Miscellaneous: a. Design & testing of drugs in humans – clinical trials bio equivalence studies. b. Advanced concepts of clinical research and compensation in clinical research. c. Acute and Chronic toxicity studies in animal models. d. Reverse Pharmacology and its applications. e. World Health Organization guide lines and other relevant guidelines such as ICMR, OECD etc. for drugs. Current status of regulatory affairs for herbal formulations. Patents and Intellectual property rights.
Chapter 5	**Pharmacognosy (10% Weightage)** Basic Concepts: 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. **Techniques:** Techniques employed in elucidation of bio synthetic pathway. Study of basic metabolic pathways (Shikkinic, Acetatemerolonate pathway 2 calvins cycle) Biogenesis of tropane, quinoline, Imidazole, Isoquinoline and Indole alkaloids; sterols, anthraquinone, saponin glycosides and flavonoids compounds of pharmaceutical significance. **Herbal formulations:** Types of herbal formulations preparation of standardized extracts suitable for incorporation into solid dosage form like tablets capsules etc. Recent trends in poly-herbal medicines. Herbal cosmetics and herbal teas. Manufacture, packaging and approach to quality control of herbal formulations. GMP for herbal drug formulations. **World Health Organization** guidelines for herbal drugs including standards for pesticide residue / aflatoxins. Current status of regulatory affairs for herbal formulations. Patents and Intellectual property rights.
References	1. 1. Cooper and Gunn. Tutorial pharmacy. 2. H.A. Liberman, Leon Lachman & J.B. Schwartz. Pharmaceutical dosage forms - Tablets, volume 1-3. 3. D.M. Brahmankar and S. B. Jaiswal, Vallabh Prakashan Pitampura, Delhi. Biopharmaceutics and Pharmacokinetics- A Treatise. 4. Milo Glbaldi Donald, R. Mercel Dekker Inc Pharmacokinetics. 5. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001). 6. Remington, Science and practice of Pharmacy, 23 rd Edition, 2023. 7. Wilsonand Giswold's Organic medicinal and Pharmaceutical Chemistry. 8. Foye's Principles of Medicinal Chemistry. 9. Burger's Medicinal Chemistry, VolI to IV. 10. Introduction to principles of drug design-Smith and Williams. 11. Remington's Pharmaceutical Sciences. 12. Martindale's extra pharmacopoeia. 13. Indian Pharmacopoeia. 14. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's

Pharmacology,. Churchil Livingstone Elsevier
15. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill
16. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
17. K.D. Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
18. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
19. W.C.Evans, Trease and Evans Pharmacognosy, 16thedition, W.B. Sounders & Co., London, 2009.
20. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
21. Text Book of Pharmacognosy by T.E. Wallis.
22. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
23. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.

Section – II: English (Weightage 50%)

Chapter	Content
Chapter 1	**Topic -I English Literature** · **Middle English Period (c.1066-1500)** Works of Geoffrey Chaucer, William Langland, John Gower, Nicholas Udall, Edmund Spenser, Ben Jonson, · **The Renaissance (c.1500-1660)** Works of Christopher Marlowe, Franscis Bacon, Edmund Spenser, William Shakespeare · **The Neoclassical Period (1600-1785)** Works of William Congreve, John Dryden, AphraBehn, John Bunyan, John Locke · **Romantic Period (c. 1785-1832)** Works of Wordsworth, Coleridge, William Blake, Keats, P.B. Shelley, Johann von Goethe, Jane Austen Thomas Grey, Lord Byron, Matthew Lewis, Anne Radcliffe · **Victorian Period (c.1832-1901)** Works of Elizabeth Browning, Alfred Lord Tennyson, Matthew Arnold, Robert Browning, Charles Dickens, the Brontë sisters, Thomas Hardy · **Modern Period (c. 1901-1945)** Works of W. B. Yeats, Seamus Heaney, Dylan Thomas, W. H. Auden, Virginia Woolf, and Wilfred Owen · **Postmodern Period (c. 1945 onward)** T. S. Eliot, Morrison, Shaw, Beckett, Stoppard, Fowles, Italo Calvino, Allen Ginsberg, Pynchon, Zadie Smith, Salaman Rushdie
Chapter 2	**Topic-II Indian writing in English** Works of R. K. Narayan, RohintonMistry, Salman Rushdie, AmitavGhosh, ArundhatiRoy,Vikram Seth, Mahesh Dattani,

Chapter 3	**Topic-III Critical Theories** · Conceptual Framework of Contemporary Literary Theory: Historical Background · Structuralism: Language and literature as Structure; StructuralistNarratology; implications of Structuralism for the study of literature · Deconstruction: Critique of logocentricism; undesidability of meaning; difference and dissemination · Psychoanalytic Theory: Discovery of the unconscious: Freud; Deviations from Freudian mapping of the Unconscious: Jung · New Historicism · Feminism
Chapter 4	**Topic-IV Basic Concepts in Linguistics** Phonetics, Phonology, Morphology, Syntax and Semantics, Linguistics and related disciplines; Sociolinguistics, Stylistics, Pragmatics
Chapter 5	**Topic-V English Language Teaching** · **Language Learning Theories:**Behaviourism, Cognitivism, Contrastive Analysis Hypothesis **Second Language Learning Theories- I**: Universal Grammar Hypothesis; Krashen's Monitor Model; Anderson's Information Processing Model Second Language Learning · **Theories- II:**Pidinization/ Acculturation · **Learners' Strategies:** Language Learning Strategies and Communication Strategies; Communicative Competence; Interlanguage Hypothesis; Error Analysis · **Methods of Language Teaching:** Approach, methods and technique; The Grammar Translation Method; Language teaching innovations in the nineteenth century and the Reform Movement; The Direct Method; The Audio-Lingual Method Communicative Language Teaching: Origin of CLT
References:	1. Akmajian, et al. 1995, Linguistics: An Introduction to Language and Communication, Prentice Hall of India: New Delhi. 2. David Lodge, ed.—Modern Criticism and Theory : A reader, London, Longman, 1988, 3. David Lodge, ed.—Twentieth Century Literary Criticism, London, Longman, 1972, 4. Eagleton, Terry. 1996. Literary Theory: An Introduction. 2nd edn. Oxford: Basil Blackwell. 5. Jeremy Harmer, The practice of English Language Teaching Pearson 6. Jim Scrivener, Learning Teaching: The Essential Guide to English Language Teaching, Mcmillan Books for teachers 7. Kachru B. B.—TheIndianization of English—The English Language in India, Delhi, OUP, 1983. 8. Kachru, B. B.—The Alchemy of English : The spread, functions and models of non-native Englishes, Delhi, OUP, 1986 9. Koach, P. 1983, English Phonetics and Phonology (CUP) 10. Kothari C.R., 'Research Methodology – Methods and Techniques',

New Age International Publishers.
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19. Research in Literature: Philosophy, Areas and Methodology by Prin. H. V. Deshpande, 820, E, Shahupuri, 4th Lane, Kolhapur
20. S. Ramaswamy and V. S. Sethuraman, eds.—The English Critical Tradition, Volumn II, Delhi, Macmillan, 1977
21. Sachdeva J.K., Business Research Methodology, Himalaya Publishing House, 2nd revised,
22. Sadhu and Singh, Research Methodology in Social Sciences, Himalaya Publishing House, Mumbai.