Syllabus for Ph.D./M. Phil. Entrance Examination

Subject : English

1. Chaucer to Shakespeare
2. Jacobean to Restoration Period
3. Augustan Age 18th Century Literature
4. Romantic Period
5. Victorian Period
6. Modern and Contemporary Period
7. American Literature
8. Indian Writing in English
9. Literary Theory and Criticism
10. Rhetoric and Prosody : Figures of Speech, prose forms, stress the line in verse, lambic, anapaestic, trochaic and dactylic blank verse, couplet, the ballad, the ode, the stanza and the sonnet.

Syllabus for Ph.D./M. Phil. Entrance Examination

पी–एच. डी. हिंदी

Subject : Hindi

पूर्णांक : 100

विषय– हिंदी

खण्ड– 'अ'

30 वस्तुनिष्ठ प्रश्न : प्रत्येक के लिए 2 अंक

(अ) प्राचीन एवं मध्यकालीन काव्य विषयक प्रश्न	06 प्रश्न
(आ) आधुनिक हिंदी काव्य विषयक प्रश्न	06 प्रश्न
(इ) हिंदी गद्य साहित्य विषयक प्रश्न	06 प्रश्न
(ई) भाषाविज्ञान एवं प्रयोजनमूलक हिंदी विषयक	06 प्रश्न
(उ) भारतीय एवं पाश्चात्य काव्य शास्त्र विषयक	06 प्रश्न

खण्ड-- 'ब'

08 लघूत्तरी प्रश्न : प्रत्येक प्रश्न के लिए 05 अंक निर्धारित

(क) तुलसीदास, सूरदास, कबीरदास, जायसी (साहित्यिक विशेषताएँ)	01 प्रश्न
(ख) रहीम, रैदास, घनानन्द, भूषण (साहित्यिक विशेषताएँ)	01 प्रश्न
(ग) भारतेंदु, जयशंकर प्रसाद, सूर्यकांत त्रिपाठी 'निराला' सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय' (साहित्यिक विशेषताएँ)	01 प्रश्न
(घ) मुक्तिबोध, नागार्जुन, धूमिल, त्रिलोचन, अशोक बाजपेयी (साहित्यिक विशेषताएँ)	01 प्रश्न
(ङ) उपन्यासकार प्रेमचंद, जैनेन्द्र कुमार, मनोहर श्याम जोशी, यशपाल	01 प्रश्न
(च) कहानीकार कमलेश्वर, राजेन्द्र यादव, अमरकांत, फणीश्वरनाथ 'रेणु'	01 प्रश्न
(छ) आचार्य रामचन्द्र शुक्ल, आचार्य नंददुलारे बाजपेयी, रामविलास शर्मा, नामवर सिंह की समीक्षा पद्धति एवं समीक्षक के रूप में प्रदेय	01 प्रश्न
(ज) हरिशंकर परसाई, शरद जोशी, श्रीलाल शुक्ल का व्यंग्य साहित्य	01 प्रश्न

SYLLABUS OF Ph.D. (COMPUTER SCIENCE & INFORMATION TECHNOLOGY)
Entrance Test

Computer Organization and Architecture: Representations of Integers, K-MAP, Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Addressing modes, Architectural classification schemes, multiprocessors..

Programming languages: Programming in C: elements of C-Tokens, identifiers, data types in C. Control structure in C. sequence, selection & iteration(s). structure, union, string, and pointers. C++ Programming: Functions parameter passing. Class and objects. Constructors and destructors. Overloading, inheritance, templates, exception handling, Pointers, Virtual Function Late Binding, Friend function, Friend class, Overview of JAVA.

Data Structures: Simple and composite structure, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps, Graph theory. Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching.

Theory of Computation: Regular languages and finite automata, DFA, NDFA Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undesirability. LR Parser, construction of SLR and canonical LR parser table, using ambiguous grammer, creating YACC lexical analyzer with LEX, error recovery in YACC, Chomsky hierarchy of languages, CFG.

Operating System: Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Belady's anomaly, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Computer Networks: ISO/OSI stack, LAN technologies (Ethernet, Token ring), Modulation Techniques, Flow and error control techniques (error correcting & detecting, CRC), Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), hubs, switches, gateways, and routers. Aloha, S-Aloha, Protocols, Network security - basic concepts of public key and private key cryptography, digital signature, firewalls, B-ISDN, ATM.

Mobile communication: Introduction, Cellular system infrastructure, Registration, Handoff Parameters and Underlying support, Roaming Support Using Backbone to Mobile IP, Functions of Mobile IP, Registration, Tunneling, Dynamic Host configuration protocol. Introduction, Characterisctics and Applications of Mobile Adhoc Network (MANET) Routing, Routing Classification.

Parallel Computing : Parallelism and its types, classification scheme, Multiprocessor and Micro Computer, Memory Module, Pipelining, Collision, RISC, CISC, Calculation of MAL, Multidimensional Array, Dependence Analysis.

Data Warehousing and Data Mining – What is data mining?, Data Mining: On what kind of data?, Data mining functionality, Are all the patterns interesting?, Classification of data mining systems, What is a data warehouse?, A multi-dimensional data model, Data warehouse architecture, Data warehouse implementation, Further development of data cube technology, From data warehousing to data mining. Concept of Transaction, Transactional database, Distributed Database, Commit Protocols.

15-02-2021

M.Phil./Ph.D. (Mathematics) Entrance Test

Session 2012-13 & Onward

The test shall consist of 100 marks. 60 marks will be for objective type questions and 40 marks will be for subjective type questions. Each objective type question will have four multiple choice answer having only one correct answer. For each correct answer of objective type question 2 marks will be allotted. Only 30 objective type questions will be set and only 8 questions of five marks and of at most 50 words will be set for each short answer type questions. The medium of entrance examination will be English. No revaluation will be permitted in any circumstances.

Course content

Analysis: Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum. Sequences and series, convergence, limsup, liminf. Bolzano Weierstrass theorem, Heine Borel theorem.

Continuity, uniform continuity, differentiability, mean value theorem. Sequences and series of functions, uniform convergence. Riemann sums and Riemann integral, Improper Integrals. Monotonic functions, types of discontinuity, functions of bounded variation, Riemann-Stieltjes integral. Metric spaces, compactness, connectedness.

Complex Analysis: Algebra of complex numbers, the complex plane, polynomials, power series, transcendental functions such as exponential, trigonometric and hyperbolic functions.

Analytic functions, Cauchy-Riemann equations. Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem. Taylor series, Laurent series, calculus of residues.

Conformal mappings, Mobius transformations.

Algebra: Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley's theorem, class equations, Sylow theorems.

Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain. Polynomial rings and irreducibility criteria.

Fields, finite fields, field extensions, Galois Theory.

Functional Analysis: Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness, equivalent norms. Riesz Lemma, basic properties of finite dimensional normed linear spaces and compactness.

Weak convergence and bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples.

Uniform boundedness theorem and some of its consequences. Open mapping and closed graph theorems. Hahn-Banach theorem for real linear spaces, complex linear spaces and normed linear spaces. Reflexive spaces. Weak Sequential Compactness. Compact Operators. Solvability of linear equations in Banach spaces. The closed Range Theorem.

Inner product spaces. Hilbert spaces. Orthonormal Sets. Bessel's inequality. Complete orthonormal sets and Parseval's identity. Structure of Hilbert spaces. Projection theorem. Riesz representation theorem. Adjoint of an operator on a Hilbert space. Reflexivity of Hilbert spaces.

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16/7/12

16/7/12

Subject: Commerce **Code No. : 08**

Unit 1: Business Environment and International Business
Unit 2: Accounting and Auditing
Unit 3: Business Economics
Unit 4: Business Finance
Unit 5: Business Statistics and Research Methods
Unit 6: Business Management and Human Resource Management
Unit 7: Banking and Financial Institutions
Unit 8: Marketing Management
Unit 9: Legal Aspects of Business
Unit 10: Income-tax and Corporate Tax Planning

Unit 1: Business Environment and International Business

- Concepts and elements of business environment: Economic environment- Economic systems, Economic policies(Monetary and fiscal policies); Political environment- Role of government in business; Legal environment- Consumer Protection Act, FEMA; Socio-cultural factors and their influence on business; Corporate Social Responsibility (CSR)
- Scope and importance of international business; Globalization and its drivers; Modes of entry into international business
- Theories of international trade; Government intervention in international trade; Tariff and non-tariff barriers; India's foreign trade policy

- Foreign direct investment (FDI) and Foreign portfolio investment (FPI); Types of FDI. Costs and benefits of FDI to home and host countries; Trends in FDI; India's FDI policy
- Balance of payments (BOP): Importance and components of BOP
- Regional Economic Integration: Levels of Regional Economic Integration; Trade creation and diversion effects; Regional Trade Agreements: European Union (EU), ASEAN, SAARC, NAFTA
- International Economic institutions: IMF, World Bank, UNCTAD
- World Trade Organisation (WTO): Functions and objectives of WTO; Agriculture Agreement; GATS; TRIPS; TRIMS

Unit 2: Accounting and Auditing

- Basic accounting principles; concepts and postulates
- Partnership Accounts: Admission, Retirement, Death, Dissolution and Insolvency of partnership firms
- Corporate Accounting: Issue, forfeiture and reissue of shares; Liquidation of companies; Acquisition, merger, amalgamation and reconstruction of companies
- Holding company accounts
- Cost and Management Accounting: Marginal costing and Break-even analysis; Standard costing; Budgetary control; Process costing; Activity Based Costing (ABC); Costing for decision-making; Life cycle costing, Target costing, Kaizen costing and JIT
- Financial Statements Analysis: Ratio analysis; Funds flow Analysis; Cash flow analysis
- Human Resources Accounting; Inflation Accounting; Environmental Accounting
- Indian Accounting Standards and IFRS
- Auditing: Independent financial audit; Vouching; Verification ad valuation of assets and liabilities; Audit of financial statements and audit report; Cost audit
- Recent Trends in Auditing: Management audit; Energy audit; Environment audit; Systems audit; Safety audit

Unit 3: Business Economics

- Meaning and scope of business economics
- Objectives of business firms
- Demand analysis: Law of demand; Elasticity of demand and its measurement; Relationship between AR and MR
- Consumer behavior: Utility analysis; Indifference curve analysis
- Law of Variable Proportions: Law of Returns to Scale

- Theory of cost: Short-run and long-run cost curves
- Price determination under different market forms: Perfect competition; Monopolistic competition; Oligopoly- Price leadership model; Monopoly; Price discrimination
- Pricing strategies: Price skimming; Price penetration; Peak load pricing

Unit 4: Business Finance

- Scope and sources of finance; Lease financing
- Cost of capital and time value of money
- Capital structure
- Capital budgeting decisions: Conventional and scientific techniques of capital budgeting analysis
- Working capital management; Dividend decision: Theories and policies
- Risk and return analysis; Asset securitization
- International monetary system
- Foreign exchange market; Exchange rate risk and hedging techniques
- International financial markets and instruments: Euro currency; GDRs; ADRs
- International arbitrage; Multinational capital budgeting

Unit 5: Business Statistics and Research Methods

- Measures of central tendency
- Measures of dispersion
- Measures of skewness
- Correlation and regression of two variables
- Probability: Approaches to probability; Bayes' theorem
- Probability distributions: Binomial, poisson and normal distributions
- Research: Concept and types; Research designs
- Data: Collection and classification of data
- Sampling and estimation: Concepts; Methods of sampling - probability and non-probability methods; Sampling distribution; Central limit theorem; Standard error; Statistical estimation
- Hypothesis testing: z-test; t-test; ANOVA; Chi–square test; Mann-Whitney test (U-test); Kruskal-Wallis test (H-test); Rank correlation test
- Report writing

Unit 6: Business Management and Human Resource Management

- Principles and functions of management

- Organization structure: Formal and informal organizations; Span of control
- Responsibility and authority: Delegation of authority and decentralization
- Motivation and leadership: Concept and theories
- Corporate governance and business ethics
- Human resource management: Concept, role and functions of HRM; Human resource planning; Recruitment and selection; Training and development; Succession planning
- Compensation management: Job evaluation; Incentives and fringe benefits
- Performance appraisal including 360 degree performance appraisal
- Collective bargaining and workers' participation in management
- Personality: Perception; Attitudes; Emotions; Group dynamics; Power and politics; Conflict and negotiation; Stress management
- Organizational Culture: Organizational development and organizational change

Unit 7: Banking and Financial Institutions

- Overview of Indian financial system
- Types of banks: Commercial banks; Regional Rural Banks (RRBs); Foreign banks; Cooperative banks
- Reserve Bank of India: Functions; Role and monetary policy management
- Banking sector reforms in India: Basel norms; Risk management; NPA management
- Financial markets: Money market; Capital market; Government securities market
- Financial Institutions: Development Finance Institutions (DFIs); Non-Banking Financial Companies (NBFCs); Mutual Funds; Pension Funds
- Financial Regulators in India
- Financial sector reforms including financial inclusion
- Digitisation of banking and other financial services: Internet banking; mobile banking; Digital payments systems
- Insurance: Types of insurance- Life and Non-life insurance; Risk classification and management; Factors limiting the insurability of risk; Re-insurance; Regulatory framework of insurance- IRDA and its role

Unit 8: Marketing Management

- Marketing: Concept and approaches; Marketing channels; Marketing mix; Strategic marketing planning; Market segmentation, targeting and positioning
- Product decisions: Concept; Product line; Product mix decisions; Product life cycle; New product development
- Pricing decisions: Factors affecting price determination; Pricing policies and strategies

- Promotion decisions: Role of promotion in marketing, Promotion methods - Advertising; Personal selling; Publicity; Sales promotion tools and techniques, Promotion mix
- Distribution decisions: Channels of distribution, Channel management
- Consumer Behaviour; Consumer buying process; factors influencing consumer buying decisions
- Service marketing
- Trends in marketing: Social marketing; Online marketing; Green marketing; Direct marketing, Rural marketing; CRM
- Logistics management

Unit 9: Legal Aspects of Business

- Indian Contract Act, 1872: Elements of a valid contract; Capacity of parties; Free consent; Discharge of a contract; Breach of contract and remedies against breach. Quasi contracts;
- Special contracts: Contracts of indemnity and guarantee; contracts of bailment and pledge; Contracts of agency
- Sale of Goods Act, 1930: Sale and agreement to sell; Doctrine of Caveat Emptor; Rights of unpaid seller and rights of buyer
- Negotiable Instruments Act, 1881: Types of negotiable instruments; Negotiation and assignment; Dishonour and discharge of negotiable instruments
- The Companies Act, 2013: Nature and kinds of companies; Company formation; Management, meetings and winding up of a joint stock company
- Limited Liability Partnership: Structure and procedure of formation of LLP in India
- The Competition Act, 2002: Objectives and main provisions
- The Information Technology Act, 2000: Objectives and main provisions; Cyber crimes and penalties
- The RTI Act, 2005: Objectives and main provisions
- Intellectual Property Rights (IPRs) : Patents, trademarks and copyrights; Emerging issues in intellectual property
- Goods and Services Tax (GST): Objectives and main provisions; Benefits of GST; Implementation mechanism; Working of dual GST

Unit 10: Income-tax and Corporate Tax Planning

- Income-tax: Basic concepts; Residential status and tax incidence; Exempted incomes; Agricultural income; Computation of taxable income under various heads; Deductions from Gross total income; Assessment of Individuals; Clubbing of incomes
- International Taxation: Double taxation and its avoidance mechanism; Transfer pricing

- Corporate Tax Planning: Concepts and significance of corporate tax planning; Tax avoidance versus tax evasion; Techniques of corporate tax planning; Tax considerations in specific business situations: Make or buy decisions; Own or lease an asset; Retain; Renewal or replacement of asset; Shut down or continue operations
- Deduction and collection of tax at source; Advance payment of tax; E-filing of income-tax returns

भौतिकी एवं खगोल भौतिकी अध्ययन शाला
पं० रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ०ग०)

प.क्र. 1479 /भौतिकी/2021 रायपुर,दिनांक 15/02/2021

प्रति

उपकुलसचिव,
अकादमिक विभाग,
पं. रविशंकर शुक्ल वि0वि0 रायपुर छ.ग.

विषयः– पी.एच.डी प्रवेश परीक्षा का पाठ्यक्रम की प्रति प्रेषित् करने बाबत्।
संदर्भः– क्र0 1464/अका./शोध/2021 रायपुर, दिनांक 11.02.2021

महोदय,

भौतिकी अध्ययनशाला के पी.एच–डी प्रवेश परीक्षा 2020–21 हेतु पी.एच.डी प्रवेश परीक्षा का पाठ्यक्रम संलग्न कर आपकी ओर प्रेषित् किये जा रहें हैं।

संलग्नः– उपरोक्तानुसार।

Professor & Head
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Syllabus for Ph.D Entrance Exam 2020-21

MATHEMATICAL PHYSICS

Vector space and Matrices, Linear independence, Bases, dimensionality, Inner product, Linear transformation, matrices, Inverse, Orthogonal and Unitary matrices, Independent element of a matrix, Eigen values and eigen Vectors, Diagonalization, Complete orthonormal sets of functions.

Complex Variables: Cauchy- Riemann condition, analytic functions,Cauchy's theorem, Cauchy integral formula, Laurent series, singularities, residue theorem, contour integration, evaluation of definite integrals, problems.

Differential equations, first order differential equation, second order differential equation with constant coefficients, second order linear ODEs with variable coefficients, Solution by series expansion, nonhomogenous differential equations and solution by the method of Green's functions.

Special functions, Legendre, Bessel, Hermite and Laguerre functions with their physical applications, generating functions, orthogonality conditions, recursion relations.

Integral transforms, Fourier integral and transforms, inversion theorem, Fourier transform of derivatives, convolution theorem, Laplace Transform(LT), LT of Derivatives, Inverse LT, Fourier series; properties and applications, discrete Fourier transform.

CLASSICAL MECHANICS

Preliminaries, Newtonian mechanics of one and many particle systems, Conservation laws,Constraints & their classification, Principle of virtual work, Generalized coordinates, D'Alembert's principle and Lagrange's equations, Velocity-dependent potentials and dissipation function, Simple applications of the Lagrangian formulation, Hamilton's principle, Lagrange's equations from Hamilton's principle, Conservation theorems and Symmetry properties, Energy function and the conservation of energy.

The Hamiltonian formulation of mechanics, Legendre transformations and the Hamilton's equations of motion, Cyclic coordinates and Conservation Theorems, Hamilton's equations from Hamilton's principle, The principle of least action, Simple applications of the Hamiltonian formulation.

Canonical transformations with examples, The harmonic oscillator, Poisson's brackets, Equations of motion and conservation theorems in the Poisson Bracket formulation. Hamilton-Jacobi (HJ) theory: The HJ equation for Hamilton's principal function, Harmonic oscillator as an example of the HJ method, The HJ equation for Hamilton's characteristic function, The action-angle variables

The Central force: Two-body central force problem and its reduction to the equivalent one-body problem, The equations of motion and first integrals, The equivalent one-dimensional problem and classification of orbits, The differential equation of the orbit, Closure and stability of orbits, The Kepler problem, Scattering in a central force field: Rutherford scattering.

Rigid body dynamics. The Euler angles, Euler's theorem on the motion of a rigid body, Rate of change of a vector, The Coriolis force, Angular momentum and Kinetic energy of motion about a point, The Euler equations of motion of rigid bodies. Formulation of the problem of small oscillations, The eigen-value equation and the principal axis transformation, Frequencies of free vibration and normal coordinates, Free vibration of linear triatomic molecule.

ELECTRODYNAMICS & PLASMA PHYSICS

Maxwell's equations, vector and scalar potentials and the wave equation, Gauge transformations, Lorenz gauge, Coulomb gauge, Green function for the wave equation, four-vectors, mathematical properties of the space-time in special relativity, matrix representation of Lorentz transformation, covariance of electrodynamics, transformation of electromagnetic fields.

Radiation by moving charges, Lienard-Wiechert potential and fields for a point charge, total power radiated by an accelerated charge- Larmor's formula and its relativistic generalization, angular distribution of radiation emitted by an accelerated charge, radiation emitted by a charge in arbitrary extremely relativistic motion, distribution in frequency and angle of energy radiated by accelerated charge.

Plasma: definition, Debye shielding phenomenon and criteria for plasma, motion of charged particles in electromagnetic field, Uniform E & B fields, Electric field drift, Non-uniform magnetostatic field, Gradient B drift, Parallel acceleration and magnetic mirror effect, Curvature drift, adiabatic invariants.

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ELECTRONICS

Operational Amplifier- Basic Op.Amp. Differential amplifier, the emitter coupled Difference Ampl. Transfer characteristics of a Diff. Ampl., an example of an IC Op.-Amp., offset error voltage and currents, measurement of Op.-Amp. Parameters, frequency response of Op-amp. Linear analog systems: Basic Op.-Amp. Applications, Analog integration and differentiation, Electronic analog computation, Non-linear analog systems: Comparators, Waveform generators. Combinational Logic – Basic logic gates: OR, AND and NOT gates, NOR and NAND gates, Boolean algebra, DeMorgan's theorems, exclusive OR gate, characteristics of logic families, saturated logic families: RTL, DCTL, non-saturated logic families: TTL and ECL, Unipolar logic families.

Sequential Logic, Flip-flops: RS Flip-flop, level clocking, Edge triggered Flip Flops, D Flip flops. JK Flip-flops, JK master slave Flip-flops, Registers: buffer, shift and control shift registers, counters: ripple synchronous & ring counters, tri-state registers, Buffer: controlled buffer Register, Bus organized structure, Latch, multiplexer, Demultiplexer, decoder, ALU Memories: RAM, ROM, PROM, EPROM, A/D and D/A converters.

Microprocessors – Building concept of microprocessors, developing inside of microprocessor , Instruction codes ,Instruction Register ,Introducing RESET Pin, Introducing on chip oscillator, Interfacing I/O devices, Introducing Interrupt lines :Stack, Push, Pop operation ,delay in servicing interrupts, multiply interrupts, location for interrupts .Introducing slow and fast data transfer, Status of microprocessor, interrupt pins, General purpose Register, flag Register, Increment/decrement register. Features of 8085 microprocessor. Pin diagram of 8085, block diagram of 8085. CPU of a microprocessor, timing and control, system timings and interrupt timings of 8085, registers in 8085, interfacing memory and I/O devices- a preliminary ideas. Number system, Floating Point notation.

Instructions set of 8085, types of instructions- Data transfer group, Arithmetic logic, branch group, stack I/O machine control group, addressing mode of Intel 8085, examples of Assembly language programs of 8085, summing of two 8-bit numbers to result a 16-bit number, summing two 16-bit number, multiplying two 8-bit number to result a 16-bit product, block transfer of data from one memory block to other, BCD to hexadecimal data, finding the largest number in a series.

QUANTUM MECHANICS

Inadequacy of classical mechanics, Plank quantum hypothesis and radiation law, Photoelectric effect, de-broglie's theory. Schrödinger equation, continuity equation, Ehrenfest theorem, admissible wave functions, general formalism of wave mechanics, representation of states and dynamical variables, stationary states, Schrödinger equation for harmonic oscillator and its solution.

Superposition principle, uncertainty relations, commutation relationship, completeness and normalization of eigen functions, Dirac-delta function, Bra & Ket notation, matrix representation of an operator, harmonic oscillator and its solution by matrix method, Heisenberg equation of motion.

Angular momentum in quantum mechanics, commutation relationships, eigen values, Spin angular momentum, Pauli's matrices, addition of angular momentum, Clebsch-Gordon coefficients.

Central force problem, spherically symmetric potentials in three dimensions, separation of wave equation, parity, three-dimensional square-well potential and energy levels, the hydrogen atom; solution of the radial equation, energy levels and stationery state wave functions, discussion of bound states, degeneracy.

Time- independent perturbation theory, non-degenerate case, first order and second perturbations with the example of an oscillator, degenerate cases, removal of degeneracy in second order, Zeeman effect without electron spin, first-order Stark effect in hydrogen, perturbed energy levels, correct eigen function, occurrence of permanent electric dipole moments.

Variational method, expectation value of energy, application to excited states, ground state of He-atom, Zero point energy of one dimensional harmonic oscillator, Vander-waals interaction, the W.K.B. approximation, approximate solutions, asymptotic nature of the solution, solution near turning point, connection formulae, energy levels of a potential well and quantization rule.

Theory of scattering: differential and total scattering cross section, wave mechanical picture of scattering & the scattering amplitude, Green's functions and formal expression for scattering amplitude, The Born approximation and its validity, Partial wave analysis, asymptomatic behavior of partial waves and phase shifts.

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e-dependent perturbation theory, first order perturbation, Harmonic perturbation, Fermi's Golden le, Ionization of a H-atom, absorption and induced emission, Selection rules. Identical particles. Relativistic quantum mechanics, formulation of relativistic quantum theory, the Klein-Gordon equation; plane wave solutions, charge and current densities, The Dirac equation for a free particle, matrices alpha and beta, Lorentz covariance of the Dirac equation, free particle solutions and the energy spectrum.

The spin of the Dirac particle, Dirac particle in electromagnetic fields and the significance of the negative energy state, Dirac equation for a central field : Spin angular momentum, approximate reduction, spin –orbit energy, separation of equation, the hydrogen atom.

STATISTICAL MECHANICS

Foundation of statistical mechanics : macroscopic and microscopic states, contact between statistics and thermodynamics, physical significance of $\Omega(N, V, E)$, the classical gas, entropy of mixing and Gibb's paradox, phase space of classical system, Liouville's theorem and its consequences, quantum states and phase space.

Elements of ensemble theory – A system in microcanonical, canonical, and grand canonical ensembles, partition functions, physical significance of statistical quantities, example of classical system, energy and energy-density fluctuations and mutual correspondence of various ensembles.

Formulation of quantum statistics – Quantum mechanical ensemble theory, density matrix, statistics of various quantum mechanical ensembles, system composed of indistinguishable particles.

Theory of simple gases –Ideal gas in various quantum mechanical ensemble, Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac distributions, statistics of occupation number.

Ideal Bose and Fermi gases -Thermodynamic behavior of an ideal Bose gas, Bose-Einstein condensation and, elementary excitations in liquid helium II, Thermodynamic behavior of an ideal Fermi gas, the electron gas, nonrelativistic and relativistic degenerate electron gas, theory of white dwarf stars.

Statistical Mechanics of interacting systems – the method of cluster expansion for a classical gas, Virial expansion of the equation of state, Theory of phase transition – general remark on the problem of condensation, Fluctuations: thermodynamic fluctuations, Spatial correlation in a fluid Brownian motion: Einstein Smoluchowski theory of Brownian motion.

ELECTRONIC & PHOTONIC DEVICES AND OPTICAL MODULATORS

Special Bipolar devices: Thyristors- the four-layer diodes and their basic characteristics, Shockley diode, three terminal thyristor, Diac & Triac, SCR, UJT, Field controlled Thyristors.

Unipotar Devices : JFET, MESFET and MOSFET, basic structure, working and device I-V characteristics, small signal equivalent circuit for Microwave performance Introduction to MIS and MOS diodes, charge coupled devices (CCDs), basic structure and working principle , MOSFET-basic device characteristics, types of MOSFET.

Special Microwave Devices: Tunnel diode and backward diode- basic device characteristics, IMPATT diodes and their static and dynamic characteristics, Transfer electron devices- transferred electron effect, Gunn diodes.

Photonic Devices : Radiative transitions, LEDs, Visible and infrared SC lasers; Photo detectors; Photo conductor, & Photodiode, Solar cells, Solar radiation and ideal conversion efficiency, p-n junction solar cells, Hetero junction. Interface thin film solar cells.

Optical Modulators and Display Devices :Modulation of light- Birefringence, Optical activity, Electro-optic, Magneto-optic and Acoustic- optic effects, Materials exhibiting these properties, Non-linear optics.Display devices: Luminescence, Photo-luminescence, Electro-luminescence, Liquid crystal displays, Numeric displays.

ATOMIC AND MOLECULAR PHYSICS

Quantum states of one electron atoms-atomic orbitals, Hydrogen spectrum, spin- orbit(l-s) interaction energy, fine structure of hydrogen spectrum including l-s interaction and relativistic correction, spectra of alkali elements, fine structure in alkali spectra, penetrating and non-penetrating orbits, intensity rules.

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i's principle, equivalent and non-equivalent electrons, ground state (basic level of different ements), two electron systems, interaction energy in L-S. and J-J. Coupling, Hyperfine structure, line oroadening mechanisms (general ideas).

Normal and anomalous Zeeman effect, early discoveries and developments, vector models of one electron system in a weak magnetic field, magnetic moment of a bound electron, magnetic interaction energy, selection rules, intensity rules, Paschen-Back(PB) effect – principal series effect, Zeeman and PB effects in hydrogen, Stark effect- discovery, Stark effect in Hydrogen, orbital model, weak and strong effect in Hydrogen.

Types of molecules: linear and diatomic molecules, symmetric top, asymmetric top and spherical top molecules. Rotational spectra of diatomic molecules: rigid rotator model, energy levels, spectrum, comparison with observed spectrum and non-rigid rotator model, Intensities of spectral lines, microwave spectrometer, Raman spectrum; classical and quantum theory of Raman Effect, pure rotational Raman spectrum.

Vibrational spectra of diatomic molecules: simple harmonic model, energy levels and spectrum, comparison with observed spectrum and an harmonic model, Vibrating rotators, Interaction of rotations and vibrations, fine structures and P-Q-R branches, IR spectrometer, Vibrational Raman spectrum, Vibrational rotational Raman spectrum.

SOLID STATE PHYSICS

Electrons in Solids and Electronic Properties, Energy bands: nearly free electron model, origin of energy gap and its magnitude, Bloch function, Kronig-Penny model, Wave equation of electron in periodic potential, restatement of Bloch theorem, crystal moment of an electron, solution of Central equation, Kronig-Penny model in reciprocal space, empty lattice Approximation, approximate solution near zone boundary, Number of orbitals in a band, metals and insulators.

Fermi surfaces and metals

Effect of temperature on F-D distribution, free electron gas in three dimension. Different zone schemes, reduced and periodic zones, construction of Fermi surfaces, nearly free electrons, electron, hole, open orbits, Calculation of energy bands, Tight binding, Wigner-Seitz, cohesive energy, pseudo potential methods. Experimental methods in Fermi surface studies, quantization of orbits in a magnetic field, de Haas van Alphen Effect, External orbits, Fermi surface of copper.

Crystal vibration and thermal properties

Lattice dynamics in monoatomic and diatomic lattice: two atoms per primitive basis, optical and acoustic modes, quantization of elastic waves, phonon momentum, inelastic neutron scattering by phonons, Anharmonic crystal interactions-thermal expansion, thermal conductivity, thermal resistivity of phonon gas, umklapp processes, imperfections.

Electron-Phonon interaction- superconductivity

Meissner effect, heat capacity, energy gap, MW, and IR properties, isotope effect. Theoretical survey : thermodynamics of superconducting transition, London equation, Coherence length, Cooper pairing due to phonons, BCS theory of superconductivity, BCS ground state, flux quantization of superconducting ring, duration of persistent currents, Type II superconductors, Vortex states, estimation of Hc1 and Hc2, single particle and Josephson superconductor tunneling, DC/AC Josephson effect.

Plasmons, Polaritons- Dielectric function of the electron gas, Plasma optics, Dispersion relation for EM wave, Transverse optical modes in Plasma, Transparency of Alkali metals in the ultraviolet, Longitudinal Plasma oscillations, Plasmon, electrostatic screening and screened Coulomb potential. Mott metal-insulator transition, screening and phonons in metals, Polaritons, LST relation .

Dielectric and ferroelectrics

Maxwell's equations, polarization, macroscopic electric field, depolarization filed, E1;local electric field at an atom, Lorentz filed E2, fields of dipoles inside cavity E3; dielectric constant and polarizability. electronic polarizability; structural phase transition; ferro-electric crystals, classification: displacive transition, soft optical phonons, Landau theory of phase transitions, first and

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ond order transition, antiferro-electricity, ferro-electric domain, piezoelectricity, ferro-elasticity, ptical ceramics.

Magnetism- General ideas of dia- and para- magnetisms, quantum theory of paramagnetism, rare earth ions, Hund rule. iron group ions, crystal field splitting, quenching of orbital angular momentum, spectroscopic splitting factor, van vleck temperature dependent paramagnetism, Cooling by isentropic demagnetization, nuclear demagnetization, paramagnetic Susceptibility of conduction electrons.

Optical Processes & Excitons and defects- Optical reflectance, excitons, Frenkel and Mott-Wannier excitons, Alkali Halides and Molecular crystals Defects: lattice vacancies, Schottkey and Frenkel point effects, colour centers, F and other centres, Line defect. Shear strength of single crystals, dislocations-edge and screw dislocations, Burger vectors, Stress fields of dislocations, low angle grain boundaries, dislocation densities, dislocation multiplication and slip, strength of alloys, dislocations and crystal growth, hardness of materials.

NUCLEAR AND PARTICLE PHYSICS

Nuclear Interactions : Nucleon-nucleon interaction, Two-nucleon system, The ground state of the deuteron, Tensor forces, Nucleon-nucleon scattering at low energy, Scattering length, Effective range theory, Spin dependence of nuclear forces, Charge independence and charge symmetry of nuclear forces, Iso-spin formalism, Exchange forces, Meson theory of nuclear forces and the Yukawa interaction.

Nuclear Reactions: Reaction energetics: Q-equation and threshold energies, Reactions cross sections, Resonance: Breit-Wigner single-level formula, Direct and compound nuclear reactions, Formal reaction theory: Partial wave approach and phase shifts, Scattering matrix, Reciprocity theorem.

Nuclear Decay : Beta decay, Femi's theory of beta decay, Shape of the beta spectrum, Total decay rate, Angular momentum and parity selection rules, Comparative half-lives, Allowed and forbidden transitions, Selection rules, Parity violation, Two component theory of neutrino decay, Detection and properties of neutrino

Gamma decay, Multiple transitions in nuclei, Angular momentum and Parity selection rules, Internal conversion, Nuclear isomerism.

Nuclear models : Liquid drop model, Bohr-Wheeler theory of fission, Shell Model, Experimental evidence for shell effects, Single particle shell model, Spin-orbit interaction and magic numbers, Analysis of shell model predictions, Magnetic moments and Schmidt lines, Collective model of Bohr and Mottelson.

Elementary particle Physics: The fundamental interactions, Classification of elementary particles, Leptons and Hadrons, Symmetries, groups and conservation laws, SU(2) and SU(3) multiplets and their properties, Quark model, Properties of Quarks, the standard model.

LASER PHYSICS AND APPLICATIONS

Laser Characteristics – Spontaneous and stimulated emission, Einstein's quantum theory of radiation, theory of some optical processes, coherence and monochromacity, kinetics of optical absorption, line broadening mechanism, Basic principle of lasers, population inversion, laser pumping, two & three level laser systems, resonator, Q-factor, losses in cavity, threshold condition, quantum yield.

Laser Systems- Solid state lasers- the ruby laser, Nd:YAG laser, ND: Glass laser, semiconductor lasers – features of semiconductor lasers, intrinsic semiconductor lasers, Gas laser -neutral atom gas laser, He-Ne laser, molecular gas lasers, CO2 laser, Liquid lasers, dye lasers and chemical laser. Laser applications.

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Ph.D. Entrance Examination

Syllabus for Home Science

The entrance exim will be conducted by the study center and will be of 2 hours. Exam will be coordinated by the head of the home science of study center. The entrance exam shall be consisting of two parts carying 100 marks in total. PartA Will be of objective type multiple choice questions of60 marks(30 questions each of 2 marks) and part B will be of 8 short answer type questions of 40 marks (each of 5 marks, at the most of 50 words.). The result of the entrance exam will be announced on the same day and displayed on the notice board of the study center.

Syllabus:-

1. Meaning, Definition, Objective, Importance, Areas & Types Of Research, Stages in the development of research.
2. Hypothesis: Meaning, Function, Formation and Importance.
3. Data Analysis, Primary and Secondary, Data collection Technique, Tabulation of Data.
4. Samplings- Meaning, Objectives and Types of samples.
5. Analysis, Interpretation and Presentation of data.
6. Writing a research Project
7. Nutrients their sources and function, food groups, food exchange lists.
8. Nutritional requirement of various age groups.
9. Estimation of energy requirement of individuals and groups.
10. Current methodologies for assessment of nutritional status and their interpretation.
11. Improvement of nutritive value of various foods, enrichment fortification.

17.9.2021

(Dr. Sandhya Verma)
Chairman

11.Improvement of nutritive value of various foods, enrichment, fortification.

12.Food preservation

13. Therapeutic adoption of normal diet.

14.Malnutrition.

15.Stages of development.

16.Factors affecting human development.

17.Methods of studying human development.

18.Exceptional children

19.Development of personality.

20.Family in social context and socio cultural studies of family background.

21.Principles and process of counselling.

22.Etiology of mental disorders.

23.Importance and objectives of process of home management.

24.Factors affecting consumer,consumer protection, Govt. legislations.

25.Family Resources.

26.Ergonomics.

27.Principles and methods of energy conservation

28.Element and principles of art and design.

29.Various colour schemes.

30.Principles of laundry science, water , soaps and detergent.

31.Fibre, its sources, classification and their manufacturing.

32.Textile finishes.

33.Colours and dyes, Dying and printing techniques.

34.Principles and types of design.

35.Construction of fabric.

36.Principles of stitching and [illegible]

37.[illegible]

38.Fashion

Ph.D (Management)

Entrance Test

SYLLABUS

INSTITUTE OF MANAGEMENT

PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

MANAGEMENT CONCEPTS AND PROCESS

- Concepts, nature, scope , significance, functions and principles of management ,historical evolutions of management thoughts Management Process, System Approaches to Management
- Planning-concepts, components and steps involved in planning process, MBO, Individual and Group Decision Making. Organizing- principles , centralization, decentralizations, delegation, employees' empowerment, line & Staff Authority, Different types of organization structures, staffing.
- Directing and Coordinating Assumptions in directing, Principles of Directing, .
- Controlling, nature, scope, functions, steps and control techniques.

ORGANISATIONAL BEHAVIOUR

- Understanding Human Behavior, Individual Differences, Personality, Attitudes, Values, Emotional Intelligence.
- Intra-personal Processes: Sensation, Perception, learning, Motivation. Inter-personal Process, stress management.
- Leadership, Socialization, Counselling, Mentoring.
- Group Behavior-Intra-group and Inter-group processes and behaviour, Team Development and Team Functioning
- Conflict Management - Intra and Inter personal conflict.

QUANTITATIVE METHODS

- Mathematical basis of Managerial Decision : Functions A.P. & G.P. and their Managerial Applications, Matrices
- Frequency Distributions and their Analysis - Measures of Central Tendency and Dispersion.
- Probability Theory and Probability Distributions – Binomial, Poisson, Normal
- Correlation and Regression Analysis (Linear)
- Index Numbers, Time Series Analysis

MANAGERIAL ECONOMICS

- Nature and Scope of Managerial Economics, Fundamental Concepts in Managerial Economics, Role and Responsibilities of Managerial Economist.
- Law & Nature of Demand, Demand Determinants, Demand Forecasting, Demand Function, Elasticity of Demand, Consumer Surplus. Law of Returns and Production Functions.
- Price-output decisions under different market conditions - Perfect and Imperfect Competition, Monopoly, Monopolistic Competition, Oligopoly, Non-Price Competition, Price Discrimination.
- Balance of Payment, Concept and measurement of National Income, Gross Domestic Savings, Gross Domestic Capital Formation.
- Nature and Concept of Profit, Theories of Profit, Business Fluctuations and Trade Cycles, Impact of Trade Cycle on Society.

ACCOUNTING FOR MANAGERS

- Financial Accounting – Concept, Importance and Scope, Generally Accepted Accounting Principles, Preparation of Financial Statements with special reference to analysis of a Balance Sheet and Measurement of Business Income
- Financial Statement Analysis - Ratio Analysis, Funds Flow Analysis, The Statement of Cash Flows
- Management Accounting – Concept, Need, Importance and Scope; Basic Concepts in Cost Accounting – Material, Labour, Overheads, Job and Process Costing.
- Budget and Budgetary Control, Types of Budget – Flexible Budget, Cash Budget.
- Costing for Decision-making, Standard Costing, Cost Volume Profit Analysis, Responsibility Accounting.

Information Technology

- Introductions to Computers- Hardware, Software, System software, Application software and packages, Introduction to embedded software
- Fundamentals of Operating System, Windows, Introduction to DBMS Concepts, Emerging Communication Technologies
- Commonly used software Packages like Microsoft Word, Microsoft Excel, Microsoft Power Point, Tally etc.
- Types of Network- LAN, WAN and MAN, Introduction to Electronic Commerce and Electronic Business
- Introduction to World Wide Web- Internet Operations- Internet Browsers and Business Websites, Use of Search Engines and Google Applications

ENVIRONMENT AND MANAGEMENT

- Business Environment: Nature, Scope and its relevance in Management Decision Making.

- State Participation in Business, Interaction between Government and Business, Socio-Cultural and Political Environment and its effect on Business.
- Government Control over price and distribution; Consumer Protection Act (CPA), New Industrial Policy of the Government, Monetary and Fiscal Policy.
- Industrial Ecology, Environmental Management System : EMS Standards, ISO 14000. Environmental Accounting and Auditing. Clearance/Permissions for establishing industry
- GATT/WTO Provisions, Patents, IPRS, Industrial Pollution – Air, Water, Land Pollution and its effects on Business, Environmental Ethics.

BUSINESS LEGISLATIONS

- The Indian Contract Act 1872, Essentials of a valid contract, Void agreements, Performance of Contracts & its remedies, Quasi-contracts. Agency, Bailment, Guarantee and Indemnity.
- An overview of The Negotiable Instruments Act 1881. Holder-in-Due Course, Arbitration.
- The Companies Act, 1956 : Nature and Types of Companies. Formation. Memorandum and Articles of Association, Prospectus Allotment of Shares, Winding Up. .
- Consumer Protection Act and IT Laws.
- An Overview of Labour Legislations in India like Industrial Dispute Act. Trade Union Act, Workmens' Compensation Act.

MANAGERIAL COMMUNICATION

- Importance and Nature of Business Communication, Channels and Media of Communication, Communication Networks, Effectiveness of Communication ; Process of Communication
- Barriers to Communication; Writing Business Reports
- Oral Communication, Resume preparations, public speaking and negotiations skills; Legal aspects of Business Communication
- Listening Skills, Presentation Skills, Non Verbal Communication
- Feedback Skills, Interview skills, Counselling Skills, Communication on Disciplinary Matters, Group Discussion and Meetings.

MANAGEMENT SCIENCE

- Management Science – Basic Concepts and its Role in Decision Making, Linear Programming: Formulation, Graphical Method, Simplex Method, Concepts of Duality, Post Optimality Analysis.
- Transportation and Assignment Models, Routing Problems
- Queuing Theory; Inventory Management Techniques
- PERT and CPM, Decision Theory.
- Game Theory; Simulation.

MARKETING MANAGEMENT

- Marketing: Concept, Nature and scope. Marketing Environment Ps of Marketing
- Marketing Information & Research, Market Segmentation and Targeting, Buying Behaviour. Understanding Consumer & Industrial Markets
- Product Decisions- Types of Product, Product Life Cycle, New Product Development Stages, Branding and Pricing Methods, Factors Influencing Pricing Decisions
- Channel Management, Sales Management, Promotion Management .
- Marketing Control. Specific Marketing Issues : Rural Marketing, Retail Marketing, Marketing of E-Business, Consumerism, Globalisation, Green Marketing
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PRODUCTION MANAGEMENT

- Meaning, Nature, Significance and Scope / Role / Functions of Production Management, Relationship with other Management Functions, Different Production Systems : Continuous and Mass Production Intermittent Production, Batch / Job-Shop Production.
- Product Design , Plant Location, Plant Layout, .
- Capacity Planning, Planning, Scheduling and Sequencing in the Context of Continuous and Intermittent Systems. TQM & SQC.
- Materials Management -Value Analysis, Waste and Scrap Disposal, Classification and Codification, Standardisation, Variety Reduction, Material Handling, JIT.
- Work study, Methods Study, Work Measurement, Industrial Safety and Safety Management, Maintenance Management.

RESEARCH METHODOLOGY

- Concepts of Research, Scientific Approach to Research, Types of Social Science Researches.. Research Process and Planning for Research, Formulation of Research Problem,
- Research Designs – Exploratory, Descriptive and Experimental Research Designs, Sampling Design, Sources and Methods of Data Collection, Observation Design, Interviewing for Research, Formulation of Questionnaire.
- Scaling Techniques, Techniques of Data Analysis (including Statistical Techniques) like ANOVA, Awareness of Software Packages relevant to Management Researches
- Interpretation of Data and Drawing Inferences, Research Report Writing, Research Publications.
- Applications in Marketing Research with special reference to Product Research, Service Research, Advertising Research and Sales Research.

BUSINESS ETHICS AND INDIAN ETHOS

- Ethics: Nature, Scope , Purpose , Importance of Ethics and moral Standards. Religion and ethics, Source of Ethics, Values
- Business Ethics: Scope , Need, Importance, Factors influencing Business Ethics, Ethical Theories, Morality and ethics
- Management Ethics: Business Ethics and society, Society expectations from business, Values for Managers, Cultural Contradictions. Spirituality and leadership
- Ethics in Business Functions: Marketing, Finance, Human Resource and Production.
- Business Ethos: Interaction between ethos, morality and law, Characteristics, Principles and issues of Business Ethos

INTERNATIONAL BUSINESS

- Basics of International trade, Balance of Payment Instruments of trade policy: tariffs, quotas.
- Institutional set-up for export promotion in India, salient features of the current EXIM policy . Export procedure documentation. Multinationals (MNCs) in India: Role of Multinationals in the development of developing countries.
- Problems and Prospects of Indian Businesses in abroad, Anti – Dumping Duties, regulatory framework of International Trade.
- Foreign Investments in India: Foreign Direct Investment (FDI) and Foreign Institutional Investment(FII) .
- WTO: Origin of WTO, Main sections of WTO agreement; Implications of enforcement of WTO on Indian Business.

MANAGEMENT INFORMATION SYSTEMS (MIS)

- Management Information System. The System Approach and System View of Business, Introduction to the Process of M.I.S. Development.
- Management Information System Design - Defining the Problem, Set System Objectives, Determining information needs, sources. Development and selection of alternative design, Gross Design, Report.
- Implementation of MIS : Stages of Implementation ; Evaluating the system , maintenance of the system.
- Information system for Decision Making, Basic Information System Related to Finance, Production, Marketing and Human Resources.
- MIS and Decision Making - Phases of Decision making process- Intelligence. Design & choice. Programmed V/s Non-Programmed Decisions. Expert System and Decision Support System.

SALES AND ADVERTISING MANAGEMENT

- Sales Management- Meaning, Significance, Functions of Sales Manager, Recruitment, Selection, Training and Motivation of Sales Personnel.
- Sales Organization - Theory of Selling, Allocation of Sales Territory, Sales Forecasting , Sales budgeting,
- Role of Advertising in Marketing Process, Legal, Ethical and Social Aspect of advertising , advertising media, types, strategy,. media selection.
- Purchase Proposition, Unique Selling Proposition, Measuring Advertising Effectiveness, Advertising Agency and its role .
- Determination of target audience, building of advertising programme – Message, Headlines, Copy Logo, Illustration Appeal, Layout.Campaign Planning, Media Planning, Budgeting, Evaluation.

INDUSTRIAL AND SERVICE MARKETING

- Nature and Scope of Industrial Marketing; Differences between Industrial Marketing and Consumer Marketing; Nature of Demand in Industrial Markets; Industrial Buyer Behaviour, Industrial Purchasing; Market Information Systems; Segmentation & Positioning of Industrial Markets.

- Technology and the Industrial Markets; Industrial Product Decisions and Strategies, Industrial Services; Industrial Pricing; Distribution and Channel Relationships;
- Concepts, Nature, Emergence, Growth and Importance of Services, Marketing Challenges, Service Classification
- Marketing Framework for Service Business, Understandings Service Market, Services and Consumer Behaviour, Segmentation of Marketing of Services.
- Marketing Mix in Service Marketing, Advertising, Branding of Services, Relationship Marketing, Retail Marketing.

STRATEGIC MANAGEMENT

- Nature, Purpose, Importance and historical evolution of Business Policy, Concept and applications of Corporate Strategy, Strategic Management : Definition, model and process for Strategy Formulation :
- Strategic Intent – Vision, Mission, Purpose and Objectives,
- Environmental Analysis : External environment and orgnisational Appraisal; Environmental threat and opportunity profile; competitive advantage of a firm, Core competency, strategic advantage profile; SWOT Analysis.
- Strategic Alternatives-merger, acquisition, diversification, mordernisation, integration, joint venture, turn around. Strategic Choice-objective and subjective considerations in strategic choice.
- Strategic Implementation, Activating Strategies, Structural Implementation, Functional Implementation, Leadership implementation, Behavioural Implementation, Strategy Evaluation, Strategic Control, Operational Control Techniques of Strategic Evaluation and Control.

HUMAN RESOURCE MANAGEMENT

- Concepts and Perspectives on Human Resource Management; Evolution and Philosophy of Human Resource Management, HR challenges in changing environment
- Human Resource Policy and Planning; Job Analysis. Methods of , Job Analysis, Description , Job specification.
- Recruiting and Selecting Human Resources ,Placement , and Induction,
- Manpower Training and Development, Performance Appraisal and Potential Evaluation; Job Evaluation, Wage Determination and Compensation management .
- Employees' Welfare; Industrial Relations & Trade Unionism; Grievance Management.

ORGANISATIONAL EFFECTIVENESS AND CHANGE

- An overview of Organisational structure. Behavioural implication of organizational structure. factors influence in designing organizational structure and job design. Organizational Effectiveness- Approaches, need and significance
- Organisational development- nature, goals, process , Diagnosis methods and intervention mechanisms
- Organizational change- need, factors, change agents, resistance and approaches to manage changes.
- Organisational conflicts – causes, nature measures to resolve organisational conflicts.
- Organisational culture and climate, organizational learning, power and politics in the organization, integration and control.

MANAGEMENT OF INDUSTRIAL RELATIONS

- Industrial Relations- concept, nature, scope, objectives. Industrial Relations system, Strategic choice theory of IR. Significance of IR in liberalization and globalisation of Indian economy.
- Trade Unionism, Problems of Indian Trade Unions. Future of Indian Trade Unionism and Related Issues, Unfair Labour Practices, Grievance - Handling Procedures.
- Industrial Disputes – Causes & Remedies.Industrial Relations Legislations-Industrial Disputes Act, Trade Unions Act, Standing Orders Act.
- Collective Bargaining stages, and Negotiation, Process, Collective, Bargaining in Indian Organisations. Disciplinary Inquiries and Actions.
- Workers' Participation in Management. Emerging Trends in Industrial Relations Management, Managing Union free organisations

COMPENSATION MANAGEMENT

- Wage Determination : Wage concepts; minimum fair and living wages. Process and Theories of Wage Determination, job Evaluation and Job Pricing. Machinery for wage fixation, Managerial Remuneration in India.

- Rewards, Incentives and Wage Differentials: Types of rewards and incentives; different incentive plans, Dearness Allowance and other Allowances, Fringe Benefits. Wage Differentials , Profits – Sharing , Co Partnership & Payment of Bonus with special reference to India.
- Wage and Productivity : Concept of Productivity, Productivity of Labour and payment of Wages , the level of living of Indian Workers wages and earnings of Indian worker. Problem of low productivity in the Indian workforce.
- Wage regulations in India : Salient provisions of : Minimum Wages Act, 1948 , Payment of Wages Act, 1936 ,Payment of Bonus Act. 1965, Equal Remuneration Act, 1976 And case laws with references to above Legislations.
- Wage Policies in India : Concept of wage policy: Objectives, Evolution and Development of wage policy and its constraints in Indian Organisations.

LEGAL FRAMEWORK OF HUMAN RESOURCE MANAGEMENT

- Emergence and Objectives of Labour Laws and their impact on Socio-Economic Environment.
- Social Security Laws- Workmen's Compensation Act, Employees' State Insurance Act.
- Provident Fund Act , Payment of Gratuity Act and Maternity Benefits Act.
- Wage Legislations and Bonus Act – The Law of Minimum Wages, Payment of Wages Act, Payment of Bonus Act.
- Laws Relating to Working Conditions in Factories Act, Contract Labour (R &A) Act.

Human Resource Development

- HRM Vs HRD, HRD Philosophy and Goals of HRD, HRD Sub-systems/Process Mechanisms , HRD Intervention Mechanism.
- Effectiveness of Training : Identifying Training Needs, Organising Training Programmes, Evaluation and Follow-up of Training, Recent Development in Training System
- Performance Appraisal & Management, Potential Appraisal & Development, Feedback and Performance Counselling,
- HRD Climate and Practices in organizations, HRD Culture, HRD Audit, HRD Culture and Climate in Indian Organisations.
- Career & succession Planning & Development, Introduction to concept and Processes of Quality Management and continuous improvement processes,

FINANCIAL MANAGEMENT

- Financial Management: An Overview, Acquisition of funds, allocation of funds and allocation of income, Nature and Scope, Profit Maximisation v/s Wealth Maximisation, Financial levarage, Operating leverage.
- Capital Budgeting : Concept and Significance, Derivative of Cash flow in a Capital Budgeting Situation, Techniques and methods of capital budgeting, conflicts between NPV and IPR, Cost of capital: assumption, determination of specific cost of capital and weighted average cost of capital.
- Working Capital Management: overview, Management of Cash, Accounts receivables and inventories, Financing current assets.
- Retained earnings and Dividend Policy, Types of Dividend, Dividend Theories, Dividend Practices in India.
- Sources of Long Term and Short-term Finance.

INTERNATIONAL FINANCIAL MANAGEMENT

- International Financial Management: Nature, Scope and Objectives, Domestic v/s International Financial Management, Theories of International Financial Management, International Financial System and institutions.
- Types of Foreign Exchange Markets and Transactions, Quoting Foreign Exchange Rates, Spread, Cross Rates, Forward Rates, Quoting Forward Rates; Organisation of the Foreign Exchange Markets; Foreign Exchange Risk.,
- Accounting and Transaction Exposures, Theory and Practice of Forecasting Exchange Rates. Forward Contracts; Future Contracts; Other Derivative Securities; Types of Traders; Futures Markets and the use of Futures in Hedging,
- Forward and Future Prices; Interest Rate Futures; Swaps; Options Markets; Properties of Stock Option Prices; Trading Strategies Involving Options; Options on Stock Indices; Currencies and Futures Contracts; General Approach to Pricing Derivatives Securities: Interest Rate Derivative Securities; Derivatives Market in India.
- International Receivables and Inventory Management, International Investment Strategy, International Cash Management, International Financial Strategies.

PROJECT PLANNING, ANALYSIS AND MANAGEMENT

- Generation and Screening of Project Idea; Capital Expenditure; Importance and Difficulties; Market Demand and Situational Analysis; Technical Analysis; Financial Analysis; Analysis of Project Risk; Firm Risk and Market Risk; Social Cost Benefit Analysis.
- Multiple Projects and Constraints; Network Techniques for Project Management. Problem of Time and Cost Overrun in Public Sector Enterprises in India; Assessment of the Tax Burden; Environmental Appraisal of Projects.
- Project Finance : Project Financing in India, Infrastructure Finance Vs. Project Finance, Business and Major Players (Global and India).

- Role of FI and banks and shift in Portfolio of FI and banks, Skills required for Career in Infrastructure Finance.
- Infrastructure Projects Appraisal in a Financial Institution : Appraisal process.

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

- Investment Return and Risk, Cost of Investing in Securities; Mechanics of Investing; Markets and Brokers; Investment Companies: Objectives of Security Analysis; Investment Alternatives; Valuation Theories of Fixed and Variable Income Securities.
- The Return to Risk and the Investment Decision; Derivative markets, Fundamental and Technical Analysis, Efficient Market Theory.
- Portfolio Management – An Optimum Portfolio Selection Problem, Markowitz Portfolio Theory, The Mean Variance Criterion (MVC) – The Nature of Investment Risk, MVC and Portfolio Selection, the Investment in Liquid Assets, Portfolios of Two Risky Securities, A Three Security Portfolio, The relationship between the Unleveraged and Leveraged Portfolio.
- Sharpe Single Index Model; Application of Market Model in Portfolio Construction; Capital Asset Pricing Model, Factor Models and Arbitrage Pricing Theory.
- Optimum Portfolios – Constructing the Optimum Portfolio, Portfolio Investment Process; Bond Portfolio Management Strategies: Investment Timing and Portfolio Performance Evaluation.

MANAGEMENT OF FINANCIAL SERVICES

- Financial System and Markets; Concept, Nature and Scope of Financial Services; Regulatory Framework for Financial Services; Management of Risk in Financial Services; Stock Exchange Operations.
- Mutual Funds; Merchant Banking Services : Managing of Issue Shares and Bonds, Hire Purchase; Debt Securitization; Housing Finance; Credit Rating.
- Venture Capital, Factoring, Forfeiting and Bill Credit Discounting, Insurance. Evaluation of an Acquisition, Takeover and Merger, Leasing and Financial Evaluation of a Lease.
- Call Money Market, Foreign Investment : FDI, FIIs investment Strategies, New Market Instruments.

MARKETING RESEARCH AND CONSUMER BEHAVIOUR

- Marketing Research – Concept, nature, scope, significance, advantages and limitations, steps involved in marketing research.
- Research design and its types, product pricing, promotion and advertising research, marketing research in India, data collection, sources of data, data analysis and interpretation , major techniques of marketing research and report writing.
- Consumer behaviour- nature , concept ,scope, significance of consumer behaviour Consumer vs customer and consumer decision making
- Internal factors influencing consumer behaviour - life style, motivation, attitude, learning, perception and personality.
- External factors influencing buying behaviour – family, groups, social class and cultural , cognitive dissonance, diffusion of innovation.

INTERNATIONAL MARKETING

- Nature, Scope and Significance of International Marketing, Foreign Trade Concepts and Theories.
- Analysis of International Marketing Environment. Trends in India's Foreign Trade, Governmental Agencies in International Marketing, Export Houses.
- International Marketing Intelligence and Marketing Research, Orgnaisational Structures in Foreign Market, Managing International Marketing Communication and its Sales Force.
- Planning for Overseas Market- Product Strategy, International Product Life Cycle, Pricing Decisions, Distribution Channel Decisions and Promoting Products for Exports including Fairs and Exhibitions.
- Export finance, Methods of Payment, Letter of Credit, ECGC, Brief study of International Economic Institutions – World Bank, GATT, UNCTAD,IMF etc.

RETAILING MANAGEMENT

- Retailing: Nature, Scope and opportunities, Types of retailers: merchandise retailers, non-store retail formats, service retailing: types of ownership, functions of retailers; FDI and retailing in India.
- Customer Buying Behaviour: types of buying decisions, buying process, social factors influencing buying decisions in retailing.
- Retail Market Strategy: definitions, retail planning process, financial strategy, location strategy, human resource strategy, retail MIS.
- Retail Mix Strategies: buying merchandise, pricing, retail communication mix, multi channel retailing.
- Managing the store, store layout and design, space planning, merchandise presentation techniques, store ambience, customer service.

School of studies in Sociology and Social Work

Pt. Ravishankar Shukla University, Raipur(C.G.)

Ph.D Entrance Syllabus 2020-21

Subject- Sociology

Note:-There will be one question paper. Part I and Part II. Part I will cover30 Objective Questions.(Multiple choice, Matching type) carrying 60 marks. Part II will have 08 short answer questions(50 to 100 words) carrying 05 marks each.

Part I for Objective Questions

SOCIOLOGICAL CONCEPTS

- **Nature of Sociology**:- Definition, Sociological Perspective
- **Basic concepts**:- Community,Institution,Association,Culture,Norms and Values
- **Social Structure**:- Status and role, their interrelation ship, Multiple roles, role Set, Status set, Status sequence and role conflict.
- **Social Group**:- Meaning, Types: Primary-Secondary, Formal-Informal, Ingroup-Outgroup, Reference group.
- **Social Institution**:- Marriage, Family
- **Socialization:**-Socialization, Resociolization, Anticipatory socialization, Adult Socialization, Agencies of Socialization, Theories of Socialization.
- **Social Stratification**:- Social Differentiation, Hierarchy and Inequality,Forms of Stratification: Caste,Class,Gender,Ethic,Theories of Social Stratification, Social Mobility.
- Social Change:- Concepts and types; Evolution, Diffusion, Revolution, transformation; Change in Structure and Change of Structure, Theories; Dialectical and Cyclical.

11/02/2021

SOCIOLOGICAL THEORY

- **Structural:**- Nadel, Radcliffe Brown, Levi-Strauss
- **Functional:**-Malinowski, Parsons, Merton
- **Integrationist:**-Social Action: MaxWeber, Pareto,Symbolic interactionism: G.H.Mead,Blumer
- **Conflict:**- Karl Marx, Dahrendorf, Coser, Collins

METHODOLOGY

- **Meaning and Nature of Social Research:**-Nature of Social Phenomena, Scientific method, the problems in the study of social phenomena, Objectivity and Subjectivity ,fact and Value
- **Quantitative methods:**- Survey, Research design and its types, Hypothesis, Sampling, techniques of Data Collection- Observation, Questionnaire, Schedule, Interview
- **Qualitative Methods:**- Participant Observation, Case study, Content Analysis.

SOCIOLOGICAL THINKERS

- Auguste Comte, Emile Durkheim, Karl Marx, Max Weber, Vilfredo Pareto

Part II short Answer Questions(50 to 100 words)

- **Phenomenology and Ethno methodology**:- Alfered Shultz, Peter Berger, Luckmamm, Garfinkel and Goffman
- **Conceptualizing Indian Society**:- Peoples of India- Groups and Communities, Unity in Diversity, Cultural Diversity- Regional, linguistic, regions, tribal.
- **Theoretical Perspectives**:- Ideological/textual Perspective: G.S.Ghurye, Louis Dumont

- **~~Structural-Functional Perspective~~**: ~~M.N.Srinivas,S.C.Dube~~

- **Contemporary Issues: Socio-Cultural**- Poverty, Inequality of Caste and Gender

- **Contemporary Issues: Development**- Population, Slums, Health problems

- **Issues pertaining to Deviance**- Deviance and its forms, Crime and Delinquency, white collar crime and corruption, changing profile of crime and criminals, Drug addiction, Suicide.

- **Current Debates:**-Tradition and Modernity in India.

- **Rural Sociology:-Approaches to the study of rural society**: Rural-Urban differences, Urbanism, Peasant Studies. **Panchayati Raj Institution**: Panchayat before and after 73rd Amendment, Rural Leadership and Factionalism, Empowerment of people.

- **Industry And Society:-Industrial Society in the Classical Sociological Tradition:** Division of labor, Bureaucracy, Rationality, Production Relations, Surplus Value, Alienation. **Industrialization and Social Change in India:** Impact of Industrialization on Family, Education and Stratification, Class and class conflict in industrial Society, Obstacles to and limitations of Industrialization.

- **Sociology of Development:-Conceptual perspectives on Development:** Economic Growth, human Development, Social Development, Sustainable development: Ecological and Social. **Social Structure and Development**: Social Structure as a Facilitator/ inhibitor. **Culture and Development:** Culture as an aid/ impediment.

17/2/2021

Pt. Ravishankar Shukla University, Raipur (C.G.)

Syllabus for Ph. D. (Economics) Entrance Examination

Statistics : Definition of Statistics, Importance and Limitations of Statistics, Measurements of central tendency (Mean, Median, Mode), Skewness– Symmetrical and asymmetrical distribution, Measurement of skewnes– Karl Pearson's coefficient of skewness, Correlation, Measurement of correlation, Karl pearson's coefficient of correlation and Spearman's rank correlation, Probable error and standard error in correlation, Partial and multiple coefficient of correlation. Regression analysis – regression and correlation, regression lines and regression coefficient, regression equations. Multiple regression analysis (up to three variables). Standard error of the estimates. Association of Attributes – Meaning and types of association, Consistency of data, methods of determining association – method of comparison of proportion, coefficient of association using Yule's method, Probability – meaning and definition, Permutation and combination, Types of events, measurement of Probability– addition and multiplication theorem, conditional probability. Index Number- Fisher's Ideal Index number Reversibility Test, Time Reversibility & Factor Reversibility.

Research Methodology : Research- meaning, types and motivation of research, Research methodology and research methods, main stages of statistical research, Statistical investigation, Census and sampling methods of statistical investigation, Statistical data, Collections of Data, Primary & Secondary Data. Precautions while constructing questionnaire, editing primary and secondary data. Methods of sampling, random and Non- random sampling methods, Computer: different parts of a computer: Hardware and software, types of computer, main characteristics of a computer, role of computer in economic research.

Indian Economy : GDP and National Income of India – Components and Structure of GDP and National Income, Role of Primary, Secondary & Tertiary Sectors in GDP of India, National income, and per capita income. Saving, Investment and Capital formation Rates in India, Demographic Features of India and Chhattisgarh, Agricultural Development in Indian Economy, Land-reforms in India, the Green Revolution, National Agricultural Policy, Food security in India, Industrial Development in India, Industrial Policies of 1956 and 1991, Public sector enterprises and their performance, Privatization and Disinvestment, small scale sector and minor medium enterprises, Planning in India– Objectives and strategies

Professor & Head
School of Studies in Economics
R S S U ... Raipur

of planning, Twelfth Five Year Plan, NITI Aayog, LPG Model, Poverty and Inequality in India, The Concept of Poverty, Measurement and Estimation of Poverty in India, Poverty Eradication Programmes, Problem of Unemployment in India- Nature of Unemployment, Various Schemes to Reduce the Unemployment, Balanced Regional Development Indicators, Causes, Changing Scenario and Policy Measures to remove Regional Disparity, Indian Finance System, Functions of the Reserve Bank of India, Commercial Banking system, Progress of Banking since 1969, Agricultural credit, Foreign Trade of India, Foreign Trade since 1991, Structure and Direction of Foreign Trade, Balance of Payments of India, Trade Reforms in India.

Text Books :

1. Kothari, C.R. and Gourav Garg, 'Research Methodology: Methods and Techniques', New Age International Publishers, New Delhi, 3rd Edition, 2014.
2. Sharma, Dr. Ramnath, 'Methods and Techniques of Social Survey and Research, A Rajhans Publication.
3. Bajpai, Dr. S.R., 'Methods of Social Survey and Research' Kitab Ghar, Kanpur-3
4. मुखर्जी, रविन्द्रनाथ, सामाजिक शोध एवं सांख्यिकी, विवेक प्रकाशन, जवाहर नगर, दिल्ली – 7
5. शुक्ला एवं सहाय, परिमाणात्मक विधियां, साहित्य भवन पब्लिकेशंस, आगरा.
6. शर्मा, वीरेन्द्र प्रकाश, रिसर्च मेथडॉलॉजी, पंचशील प्रकाशन, जयपुर, राजस्थान
7. Ahulwalia, I. J. and I. M. E. Litle (Eds.) 1999): India's Economic Reforms and Development (Essay honor of Manohar Singh), Oxford University Press, New Delhi,.
8. Bardhan, P. K. (9th Edition) (1998): The Political Economy of Development India, Oxford University Press, New Delhi.
9. Bawa, R.S. and Raikhy (Ed.) (1997): Structural Change in Indian Economy, Guru Nanak Dev University Press. Amritsar (PB).
10. Brahmananda, P. R. and V. R. Panchmukhi (9th Eds.) (2001): Development Experience in the Indian Economy : Interstate Perspectives, Bookwell, Delhi.
11. Chakravarty, S. (1987): Development Planning: The Indian Experience, Oxford University Press, New Delhi.
12. Dantwala, M. L. (1996): Dilemmas of Growth: the Indian Experience, Sage Publication, New Delhi.
13. Puri, V. K. and Mishra Indian Economy, (38th Revised & Updated Edition) Himalaya Publishing House, New Delhi, Jan. 2020.
14. Karuppiah, Sankarganesh, Indian Economy- Key concepts, (Sixth Edition) Mc Graw-Hill publications, Jan. 30, 2020.
15. Singh, Ramesh Indian Economy, (12th Edition) Mc Graw- Hill publications, July 18, 2020.

Professor & Head
School of Studies in Economics
C. R. S. S. Univ. Rajpur

SOS in Library & Information Science
Syllabus for M.Phil / Ph.D. Entrance Exam

UNIT-1 Information Science

- Definition, Scope, Objectives, Genesis and Development
- Information Science as a discipline and its relationship with other subject fields
- Information Industry – Generators, Providers and intermediaries
- Press and Registration Act, Delivery of books (Public Library) Act, Copy right Act
- UAP,UBC
- Communication – Channels, barriers

UNIT-2 Knowledge Organization Processing

- Types, Structure & qualities, canons of notation.
- Mnemonics- Types and canons, Indicator digits.
- Zone analysis and sector notation.
- Canons for book classification.
- Systems of book number.
- Canons of knowledge classification
- Canons of cataloguing

UNIT-3 Research

- Concept, Meaning, need and process of research
- Types of Research- Fundamental and Applied
- Research Methods- Scientific, Historical, Descriptive, Survey and case study methods, Experimental method and Delphi Method
- Research techniques & Tools- Questionnaire, Schedule, Interview, observation and sampling techniques
- Research Design – Types of research design identification and formulation of problem Hypothesis
- Research report writing

UNIT - 4 Management

- Management styles and approaches
- Management Schools of thought
- Function and Principles of scientific management
- Human Resource Management- Organization Structure, Job analysis and description, Job evaluation, Motivation, staff manual leadership & performance evaluation
- System analysis- definition, concept and characteristics, Library as a system.
- Financial Management – Resource generation, types of budgeting, cost benefit analysis
- TQM

Unit -5 Indexing System

- Pre coordinate and post coordinate indexing system
- KWIC, KOWC
- Chain Indexing, PRECIS, POPSI
- Uniterm Indexing, Citation Indexing
- Standards for Bibliographical Description: AACR-2, ISBD, MARC(Format), CCF, OPAC

Unit -6 Information Sources

- Documentary sources of information.
- Print, Non-print including Electronic Nature.
- Characteristics, Utility and evaluation of different types of information sources.
- Non Documentary Information sources.
- Human and institutional – Nature, Types, Characteristics and utility, Internet as a source of information.

Unit-7 Information Technology

- Operating system- Ms-Windows, Ms-DOS.
- Programming languages, Algorithms, Flowcharting.
- Networking- types of networks- LAN, WAN, MAN, INTERNET
- Web Browser, Web servers, Search Engines, Meta search, Web- design-SGML, HTMM, DHTMLs, XML.
- Relational and object oriented software- CDS/ISIS, SOUL.
- Digital Libraries – Concept, Virtual libraries- concept
- INFLIBNET

Unit-8 Management Information Systems

- Definition, Concepts, Elements and characteristics of M.I.S.
- Planning for MIS-Systems analysis, Systems design.
- Information support system- MRS, DSS, OAS, KBS.
- Financial Information systems, Marketing IS & Human resource IS.
- Role of computers in MIS, Data base management

Unit- 9 Library Organization

- Meaning ,importance, principle and types
- Five laws of library science
- UNESCO, IFLA, ALA, ILA, IASLIC
- Library statistics and Annual Report
- Resource sharing
- RRLF

Unit- 10 Reference Services

- Reference Services – concept, definition and importance, types
- Orientation of freshman and users education.
- Evaluation of Dictionaries and Encyclopedia
- Evaluation of Year Books, Almanacs, Directories, Current reference sources
- Evaluation of Geographical sources, Biographical sources.

Syllabus for Ph.D./M. Phil. Entrance Examination

पी–एच. डी. भाषाविज्ञान

Subject : Linguistics

विषय– भाषाविज्ञान

पाठ्यक्रम

Syllabus

1. भाषा– परिभाषा एवं विशेषताएँ, भाषा के अवयव– ध्वनि, रूप, शब्द, पदबंध, उपवाक्य, वाक्य, अर्थ, भाषा–परिवर्तन के कारण एवं दिशाएँ

   भाषाविज्ञान– परिभाषा, प्रकृति, भाषाविज्ञान की शाखाएँ (सैद्धांतिक एवं अनुप्रयुक्त) ध्वनिविज्ञान, रूपविज्ञान, वाक्यविज्ञान, अर्थविज्ञान, समाजभाषाविज्ञान, शैलीविज्ञान, भाषाशिक्षण, भाषा–भूगोल, आदि।

Language- Definition and Characteristics, Constituents of Language- Sound, Morph, Word, Clause, Sentence, Meaning, Causes and Directions of Language Change.

Linguistics- Definition and Nature, Branches of Linguistics (Theoretical & Applied)- Phonetics, Morphology, Syntax, Semantics, Sociolinguistics, Stylistics, Language Teaching, Linguistic Geography, etc.

2. ध्वनिविज्ञान– वाक्–अवयवों का परिचय, ध्वनि–उच्चारण में उनकी भूमिका, ध्वनियों का वर्गीकरण, स्वरों का वर्गीकरण, व्यंजनों का वर्गीकरण,

   रूपविज्ञान– प्रकृति एवं क्षेत्र, शब्द–साधन, रूप–साधन, रूप, संरूप, रूपिम– परिभाषा एवं अंतर

Phonetics- Introduction of Organs of Speech and Their Role in Production of Sound, Classification of Speech Sounds, Classification of Vowels, Classification of Constants.

Morphology- Nature & Scope, Derivational and Inflectional, Morphs, Allomorphs and Morpheme- Definition and Differences.

3. वाक्य विज्ञान– वाक्य के अवयव, वाक्यों के प्रकार– रचना की दृष्टि से, अर्थ की दृष्टि से, निकटस्थ अवयव विश्लेषण, रूपातंरण प्रजनक व्याकरण, आंतरिक एवं बाह्य संरचना, कारक व्याकरण, प्रोक्ति की अवधारणा, प्रोक्ति–प्रकार।

   अर्थविज्ञान : क्षेत्र, अर्थ, प्रकार, अर्थ–परिवर्तन के कारण एवं दिशाएँ।

Syntax- Componants of a Sentence – Types- Structurally, Sementically, Immediate Constituent Analysis,

M. P. Ghosh 18-2-21 Sheuli Sen

Transformational Generative Grammar Deep & Surface Structure, Case Grammar, Concept of Discourse, Discourse-Types.

Semantics- Scope, Meaning , Types, Causes and Directions of Semantic Change.

4. भाषा एवं शैली, शैली–प्रकार, शैलीविज्ञान–परिभाषा एवं प्रकृति, शैलीविज्ञान एवं अन्य विज्ञानों में संबंध, शैलीविज्ञान अध्ययन के प्रतिमान।

अनुवादविज्ञान, अनुवाद– परिभाषा, उद्देश्य, महत्व, अनुवाद के प्रकार अनुवाद–प्रक्रिया, अच्छे अनुवादक की विशेषताएँ, सफल अनुवाद।

Language & Style, Style-Types, Stylistics- Definition and Relationship between Stylistics and other Disciplines, Norms of Stylistic Study,

Translatology, Translation- Definition, Aims, Importance, Typenof Translation, Process of Traslation, Qualities of Good Translator, Good Translation.

5. प्रयोजनमूलक भाषा का स्वरूप, भाषा के विविध रूप–कार्यालयी, विज्ञान, विधि, विज्ञापन, आदि।

भाषा और राष्ट्र, भाषा–नियोजन, राष्ट्रभाषा, राजभाषा, पारिभाषिक शब्दावली, भाषा और कम्प्यूटर।

Nature of Functional Language, Different Forms of Language-Official, Literature, Science, Law, Advertisement, etc.

Language & Nation, Language Planning, National Language, Official Language, Technical Terminology, Language & Computer.

इलेक्ट्रॉनिक्स एवं फोटोनिक्स अध्ययन शाला

पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

क्रं. 532/इले. /2020–21 रायपुर, दिनांक 17/02/2021

प्रति,

विशेष कर्तव्यस्थ अधिकारी
(अकादमिक)
पं. रविशंकर शुक्ल वि.वि.
रायपुर (छ.ग.)

विषय : पी.एच डी प्रवेश परीक्षा 2020–21 हेतु Syllabus भेजने बाबत्।

संदर्भ : 1462/अका./शोध./2021 रायपुर दिनॉक 11.02.2021

महोदय,

विषयांतर्गत संदर्भित पत्र के अनुक्रम में पी.एच डी प्रवेश परीक्षा 2020–21 हेतु Syllabus की Hard Copy पत्र के साथ संलग्न कर प्रेषित की जा रही है।

संलग्नः- Syllabus (03 पृष्ठों में)

विभागाध्यक्ष
S.O.S. in Electronics
Pt. Ravishankar Shukla University
Raipur (C.G.) 492 010

532/इले/21
17/02/21

18.2.21

SoS in Electronics & Photonics
Pt. Ravishankar Shukla University, Raipur Chhattisgarh

SYLLABUS ENTRANCE TEST
FOR Ph.D. in ELECTRONICS

UNIT-I

Introduction to Semiconductor, energy bands in solids, **Semiconductors:** Direct and indirect band gap methods to determine the Forbidden gap, mobility and conductivity, intrinsic and extrinsic semiconductor, Impurities, carrier concentration, electrical properties of Ge and Si, experimental methods to study the electrical parameters, Drift and Diffusion, Hall effect, electrons and phonons in semiconductors. Zener diode, Tunnel diode, Metal semiconductor junction – Ohmic and Schottky contacts, Characteristics and equivalent circuits of JFET, MOSFET. Low dimensional semiconductor devices – quantum wells, quantum wires, quantum dots. High Electron Mobility Transistor (HEMT), Solar cells – I-V characteristics, fill factor and efficiency, Solar cell materials and their properties. LED, LCD and flexible display devices. Emerging materials for future Devices: Graphene, Carbon Nano tubes (CNT), ZnO, SiC etc.

UNIT-II

IC fabrication – crystal growth, epitaxy, oxidation, lithography, doping, etching, isolation methods, metallization, bonding, Thin film deposition and characterization Techniques: XRD, TEM, SEM, EDX, Thin film active and passive devices, MOS technology and VLSI, scaling of MOS devices, NMOS and CMOS structures and fabrication, Characteristics of MOS transistors and threshold voltage, NMOS and CMOS inverters, Charge-Coupled Device (CCD) – structure, charge storage and transfer,

UNIT-III

Superposition, Thevenin, Norton and Maximum Power Transfer Theorems, Network elements, Network graphs, Nodal and Mesh analysis. Laplace Transform, Fourier Transform and Z-transform. Time and frequency domain response, Passive filters, Two-port Network Parameters : Z, Y, ABCD and h parameters, Transfer functions, Signal representation, State variable method of circuit analysis, AC circuit analysis, Transient analysis, Zero and Poles, Bode Plots.

Continuous time signals, Fourier Series and Fourier transform representations, Sampling theorem and applications, Discrete time signal, Discrete Fourier transform (DFT), Fast Fourier transform (FFT).

UNIT – IV

Rectifiers, Voltage regulated ICs and regulated power supply, Biasing of Bipolar junction transistors and FETs, operating point and stability, Amplifiers, Classification of amplifiers, Concept of feedback, Hartley, Colpitt's and Phase Shift oscillators, Operational amplifiers (OPAMP) - characteristics, computational applications, comparators, Schmitt trigger, Instrumentation amplifiers, wave shaping circuits, Phase locked loops, Active filters, Multivibrators, Voltage to frequency convertors (V/F), frequency to voltage convertors (F/V).

UNIT-V

Logic Families, Logic Gates, Boolean algebra and minimization techniques, Combinational circuits, Programmable Logic Devices (PLD), CPLD, flip-flops, memories, Sequential Circuits: Counters – Ring, Ripple, Synchronous, Asynchronous, Shift registers, multiplexers and demultiplexers, A/D and D/A converters, Analysis and Design of fundamental mode state machines: State variables, State table and State diagram. Sequential PLD, FPGA.

UNIT-VI

Introduction of Microprocessor 8086: Architecture, Addressing modes, instruction set, interrupts, Programming, Memory and I/O interfacing.
Introduction of Microcontrollers – 8051 for embedded systems, Architecture and register set of Microcontroller 8051, Addressing modes, Instruction set of 8051 – Data transfer instructions, Arithmetic instructions, Logic instructions, bit level and byte level control transfer instructions, 8051 assembly programming – stack operations, subroutines, interrupts, 8051 programming as timer/counter, 8051 serial communication, 8051 interfacing RS232, LED/LCD display, Keyboard , Stepper motor.

UNIT-VII

Light as Electromagnetic wave, Polarization of Light, Principle of superposition, Interference, Diffraction, Scattering, Photon nature of light, Silicon P-N photodiodes, hetrojuncton photodiodes, schottkey barrier diode, P-I-N photodiodes, avalanche photodiodes, and phototransistors. Molecular materials, Organic Semiconductors, Electronic states in conjugated molecules, Conjugated polymers, Basics of OLED , Solar cell research: technology (silicon, organic, Dye sensitized, peroviakites), applications and limitations.LED materials Solar cell materials and their properties. Solar cell research: technology (silicon, organic, Dye sensitized, perovskites), applications and limitations. Solar Simulators.
Non Linear Optics Kerr effect, Pockels effect, Farady effect, Electro-Optic Modulator. silicon photonics, Silicon on Insulator (SOI) waveguides or nanowires

UNIT-VIII

Basic principle of lasers, laser pumping, stimulated emission, light amplification, threshold condition, Einstein's coefficient, laser rate equations, mode locking and Q-switching of lasers. Ruby Laser, He-Ne laser, Ar-ion laser, Co2 laser, Solid State Laser: Host material and its characteristics, doped ions Nd:YAG laser, Liquid laser: Dye laser, Semiconductor laser
Laser in manufacturing, laser cutting of material, laser marking, laser transmitter, measurement of distance through Laser
Transmission lines and waveguides – line equations, impedance, reflections and voltage standing wave ratio, rectangular waveguides. Antennas – retarded potential and Hertzian dipole, half wave antenna, antenna patterns, radiation intensity, gain, effective area and Frii's free space receiver power equation.
Microwave Sources and Devices -Reflex Klystron, Magnetron, TWT, Gunn diode, IMPATT diode, Crystal Detector and PIN diode.
Radar – block diagram of Radar, frequencies and power used, Radar range equation.

UNIT- IX

Analog modulation and demodulation - AM, FM and PM, Principle of super heterodyne receiver, Random signals, noise, noise temperature and noise figure, Basic concepts of information theory, Error detection and correction, Digital modulation and demodulation – PCM, ASK, FSK, PSK, BPSK, QPSK and QAM, Time and Frequency-Division Multiplexing, Multiple Access techniques, Data Communications – Modems, Codes, Principles of Mobile and Satellite Communication, Optical communication, Optical sources - LED, spontaneous and stimulated emission, semiconductor Lasers, Optical fibers – attenuation and dispersion characteristics, Bandwidth, Wavelength division multiplexing.
Fundamentals of Internet of Things (IoT) for communication.

UNIT-X

Power devices – characteristics of SCR, DIAC, TRIAC, power transistors, Protection of thyristors against over voltage and over current. SCR triggering - dv/dt and di/dt, triggering with single pulse and train of pulses, A.C. and D.C. motors - construction and speed control. Switched Mode Power Supply (SMPS). Uninterrupted Power Supply (UPS).

Open loop and closed loop control system, Block Diagram reduction techniques, transfer function and signal flow diagram, Stability criterion: Routh-Hurwitz and Nyquist plot, On-off controller, Proportional (P), Proportional-Integral (PI), Proportional-Derivative (PD), PID controllers.

UNIT – XI

Transducers – Resistance, Inductance, Capacitance, Piezoelectric, Thermoelectric, Hall effect, Photoelectric, Measurement of displacement, velocity, acceleration, force, torque, strain, temperature, pressure, flow, humidity, thickness, pH. Measuring Equipment – Measurement of R, L and C, Bridge and Potentiometers, voltage, current, power, energy, frequency/time, phase, Digital Multimeters, CRO, Digital Storage Oscilloscope, Spectrum Analyzer., Biomedical Instruments – ECG, EEG, Sensors for IoT applications.

Reference Books

1. Adel S. Sedra and K C. Smith, "Microelectronic Circuits", 5 edition, Oxford University Press,2004.
2. Schilling, Belove, "Electronic Circuits", Third edition, Tata McGraw-Hill, 2006
3. D. M. Pozar "Microwave Engineering", Publisher: Wiley
4. Symon Haykins "Principles of Communication systems", John Wiley
5. Bookhive's Net Electronics Sciences Paper
6. Fundamentals of Photonics, by B.E.A. Saleh and M.C. TeichWiley India Pvt Ltd; 2 editio
7. Trueman's UGC NET/SET General Paper IM. Gagan and Sajit Kumar
8. Optical Electronics - Ghatak Thyagarajan, University Press
9. A Text book of Electrical Technology (Volume –II) - B. L. Thereja & A K Theraja, S Chand & Co. Ltd (2006)
10. Electronic Devices and Circuit Theory, 9th ed. Boylestad & Nashelsky PHI
11. Microelectronics - Jacob Millman, Arvin Grabel, Tata Macgraw-Hill
12. Physics of Semiconductor Devices: Shur PHI
13. M. Moris Mano, Digital Design, PHI Learning Pvt. Ltd. New Delhi.
14. Networks and System - D. Roy Choudhary, New Age International
15. Microprocessor Architecture Programming - Ramesh S. Gaonkar & Application with 8085/8080 Penram Int. Pub
16. Microwave Devices and Circuits – Samuel Y. Liao, PHI Pub
17. Yu Cheng Liu, Glenn A. Gibson, Microcomputer systems: The 8086/8088 family architecture, programming and design, Prentice Hall of India, New Delhi.
18. Design with PIC Microcontrollers – John B.Peatman, Pearson Education Asia
19. PIC Microcontrollers: An Introduction to Microelectronics, Martin P. Bates, Elsevier.
20. D.V.S. Murti, Transducers and Instrumentation, PHI Learning Pvt Ltd, New Delhi.
21. Douglas A. Skoog, F. james Holler, and Stanley R. Crouch, Instrumental Analysis, CENGAGE Learning, Indian Edition.
22. Handbook of Biomedical Instrumentation Khandpur

Ph.D. (Statistics,) Entrance Examination , 2020-21.

Syllabus

The M. Phil. Course offered in Statistics shall be based on the admission test conducted by the University for this purpose. M. Phil. entrance test examination will be of two hrs. duration. The test shall consist of 100 marks. There will be 30 multiple choice questions with two marks each and 8 short answer type questions with 5 marks each. Atmost 50 words will be set for each short answer type question. The medium of entrance examination will be English. No revaluation will be permitted in any circumstances.

The questions in the M. Phil. entrance examination will be asked on the following topics:

(1) Statistical Methods
(2) Statistical Inference
(3) Sampling Theory
(4) Design of experiments

1. Statistical Methods

Frequency distribution, measures of location, dispersion and skewness, Moments and cumulates, moment generating function.
Simple correlation coefficient, Rank correlation, Multiple and Partial Correlation. Regression. Curve fitting.

Definition of probability, Bays theorem, Basic distribution function probability mass function, probability density function, joint, marginal and conditional p.m.f. Random Variable and its mathematical expectation, conditional Expectation, Expectation of sum and multiplication of random variables.

Standard Discrete Distributions- Bernoulli, Binomial, Poisson, Geometric, Hyper geometric and Multinomial distribution. Limiting form of Binomial and Poisson distributions.

Standard Continuous distributions- Uniform, Exponential, Normal and Cauchy distributions.

Sampling distributions. Chi-square, t- and F- distributions. Sampling distributions of mean and variance of a sample from a normal population.

2. Statistical Inference

Unbiasedness , Consistency, efficiency and sufficiency of point estimator , Fisher –Neymann factorization theorem, Cramer Rao inequality, Minimum Variance unbiased estimators.

Liklihood function, examples from standard discrete and continuous distributions. such as Bernoulli, Binomial, Possion, Normal, Exponential Gamma etc)

Methods of estimation – Method of maximum likelihood estimators, properties of maximum likelihood estimators. Method of scoring, method of moments, method of minimum chi-square, method of minimum variance, B.A.N. estimators.

Rao Blackwell theorem. Invariant estimators, Confidence interval and confidence coefficients, Confidence interval for large samples.

Concepts of critical regions, Test functions, two kinds of errors. Size function, power function, level, M. P. and U,M.P. Test, Neymann Pearson Lemma, M. P. test for simple null against simple alternative hypothesis ,UMP test for simple null hypothesis against one sided alternatives in one parameter exponential family .Unbiased test, UNIFORMELY most powerful unbiased test.

Liklihood ratio test and its properties. Likelihood ratio test for the mean of normal population, LR test for equality of means and variances of two and several normal populations.

Non parametric test, Rank test, Wilcoxon test, Median test, Sign test, Mann-Whitney U test, Wald-Wolfowitz run test, Kolomogorov-Smirnov test, One sample location problem, chi square test of goodness of fit.

3. Sampling Theory

Sample Surveys: Simple random sampling, Estimation of population proportion, Non-sampling errors.

Stratified sampling, Optimum allocation, Neyman allocation and Proportion allocation, systematic sampling, Comparison of stratified, systematic and simple random sampling, estimation of gain in precision due to stratification, Post Stratification, Systematic sampling under a linear model.

Ratio and regression estimators. Bias of ratio estimate, optimum property of ratio estimate, Regression estimate with pre-assigned and with estimated regression coefficient, comparison of ratio and regression estimate with sample mean.

Unequal probability sampling: pps methods [including Lahiri's scheme] and related estimators of a finite population mean.

Cluster sampling. Two stage sampling, Hurwitz-Thompson estimation.

4. Design of Experiments

Introduction to design of experiments, Principles of design of experiments, Completely randomized design, Randomized block design, Latin square design. Missing plot technique-general theory and applications, efficiency of design. Factorial experiments, Split Plot Design.

SCHOOL OF STUDIES IN CHEMISTRY

रसायन अध्ययन शाला

(DST FIST SPONSORED & UGC-SAP (DRS-II) ASSISTED DEPARTMENT)

PT. RAVISHANKAR SHUKLA UNIVERSITY,

रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

RAIPUR-492010 (CHHATTISGARH)

कमांक /415 /रसायन अ.शा./2021 रायपुर, दिनांक 15.02.2021

प्रति,

कुलसचिव,

पं. रविशंकर शुक्ल विश्वविद्यालय,

रायपुर (छ.ग.)

विषय :-. Syllabus (Ph.D Entrance Exam, Chemistry 2020-21) भेजने बाबत् ।

संदर्भ:– कमांक / 1462 / अका. / 2021 रायपुर, दिनांक 11 / 02 / 2021

उपरोक्त संदर्भित पत्र के अनुकम में लेख है, कि रसायन अध्ययनशाला का Syllabus (Ph.D Entrance Exam Chemistry 2020-21) पत्र के साथ संलग्न कर प्रेषित हैं।

15/2/2021

विभागाध्यक्ष,

रसायन अध्ययनशाला,

पं. रविशंकर शुक्ल विश्वविद्यालय,

रायपुर (छ.ग.)

Head
School of Studies in Chemistry
Pt. Ravishankar Shukla University
RAIPUR (C.G.)

OSD (Acad)

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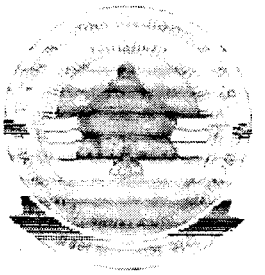

SYLLABUS

Ph. D. Entrance Exam - Chemistry

2020-2021

PT. RAVISHANKAR SHUKLA UNIVERSITY

RAIPUR

CHHATTISGARH

FIRST SEMESTER

PAPER NO 1. CH –101

GROUP THEORY AND CHEMISTRY OF METAL COMPLEXES

Max. Marks 80

UNIT - I

SYMMETRY AND GROUP THEORY IN CHEMISTRY: Symmetry elements and symmetry operation, definitions of group, subgroup, relation between orders of a finite group and its subgroup. Conjugacy relation and classes. Point symmetry group. Schoenflies symbols, representations of groups by matrices (representation for the C_n, C_{nv}, C_{nh}, D_{nh}, etc. groups to be worked out explicitly). Character of a representation. The great orthogonality theorem (without proof) and its importance. Character tables and their use in spectroscopy.

UNIT - II

A. **METAL-LIGAND BONDING:** Limitation of crystal field theory, molecular orbital theory, octahedral, tetrahedral and square planar complexes, bonding and molecular orbital theory.

B. **METAL-COMPLEXES:** Metal carbonyls, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding, structure and important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes; tertiary phosphine as ligand.

UNIT –III

A. **METAL–LIGAND EQUILIBRA IN SOLUTION:** Stepwise and overall formation constants and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin, determination of binary formation constants by pH-metry and spectrophotometry.

B. **ISOPOLY ACID AND HETEROPOLYACID:** Isopoly and heteropoly acids of Mo and W. Preparation, properties and structure. Classification, Preparation, properties and structures of borides, carbides, nitrides and silicides. Silicates- classification and Structure, Silicones- preparation, properties and application.

UNIT – IV

A. **METAL CLUSTERS:** Higher boranes, carboranes, metalloboranes and metallocarboranes. Metal carbnonyl and halide cluster, compounds with metal-metal multiple bonds.

B. **CHAINS:** catenation, heterocatenation, intercatenation.

C. **RINGS:** Borazines, phosphazines.

BOOK SUGGESTED:

1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harpes and Row.
3. Chemistry of the Elements, N.N. Greenwood and A. Earnshow, Pergamon.
4. Comprehensive Coordination Chemistry Eds. G. Wilkinson, R.D. Gillars and J.A. McCleverty, Pergamon.

PAPER NO 2. CH –102

CONCEPTS IN ORGANIC CHEMISTRY

Max. Marks 80

UNIT - I

A. **NATURE OF BONDING IN ORGANIC MOLECULES:** Localized and Delocalized chemical bond, conjugation and cross-conjugation, Bonding in Fullerenes, Bonds weaker than covalent, addition compounds,

Crown ether complexes and cryptands. Inclusion compounds, Cyclodextrins, Catenanes and Rotaxanes.

B. **AROMATICITY:** Aromaticity in benzonoid and non-benzenoid compounds, Huckel anti-aromaticity, homo-aromaticity. PMO approach for Aromaticity, Annulenes.

UNIT - II

A. **CONFORMATIONAL ANALYSIS:** Conformational analysis of cycloalkanes, decalins, effect of conformation on reactivity, conformation of sugars, steric strain due to unavoidable crowding.

B. **STEREOCHEMISTRY:** Elements of symmetry, chirality, molecules with more than one chiral center, methods of resolution, optical purity, stereospecific and stereoselective synthesis. Asymmetric synthesis. Optical activity in the absence of chiral carbon - Biphenyls, allenes and spiranes, chirality due to helical shape.

UNIT - III

A. **REACTION INTERMEDIATES:** Generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes and nitrenes. Sandmeyer reaction, Free radical rearrangement and Hunsdiecker reaction.

B. **ELIMINATION REACTIONS:** The E_2, E_1 and E_1cB mechanisms. Orientation of the double bond. Reactivity, effects of substrate structures, attacking base, the leaving group and the medium.

UNIT - IV

PERICYCLIC REACTIONS: Classification of pericyclic reactions. Woodward-Hoffmann correlation diagrams. FMO and PMO approach. Electrocyclic reactions - conrotatory and disrotatory motions, 4n, 4n+2 and allyl systems. Cycloadditions - antrafacial and suprafacial additions, 4n and 4n+2 system, 2+2 addition of ketenes, 1,3 dipolar cycloadditions and cheleotropic reactions. Sigmatropic rearrangements - suprafacial and antarafacial shifts of H, sigmatrophic shifts involving carbon moieties, 3,3- and 5,5- sigmatropic rearrangements. Claisen, Cope and Aza-Cope rearrangements. Ene reaction.

BOOKS SUGGESTED:

1. Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Plenum.
2. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
3. Structures and Mechanism in Organic Chemistry, C. K. Ingold, Cornell University Press.
4. Organic Chemistry, R. T. Morrison and R. N. Boyd, Prentice-Hall.
5. Modern Organic Reactions, H. O. House, Benjamin.
6. Principles of Organic Synthesis, R. O. C. Norman and J. M. Coxon, Blackie Academic and Professional.
7. Pericyclic Reactions, S. M. Mukherji, Macmillan, India.
8. Reaction Mechanism in Organic Chemistry, S. M. Mukherji and S. P. Singh, Macmillian.
9. Stereochemistry of Organic Compounds, D. Nasipuri, New Age International.
10. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge Univ. Press.
11. Rodd's Chemistry of Carbon Compounds, Ed. S. Coff
12. Organic Chemistry, Vol 2, I. L. Finar, ELBS.
13. Stereo selective Synthesis: A Practical Approach, M. Nogradi, and VCH.
14. Organic Chemistry, Paula Yurkanis Bruice, Pearson Education.

PAPER NO 3. CH –103

QUANTUM CHEMISTRY, THERMODYNAMICS AND CHEMICAL DYNAMICS - I

Max. Marks 80

UNIT - I

A. MATHEMATICAL CONCEPTS IN QUANTUM CHEMISTRY:

Vector quantities and their properties. Complex numbers and Coordinate transformation. Differential and Integral Calculus, Basic rules of differentiation and Integration applications.

B. The Schrodinger equation and postulates of quantum mechanics. Discussion of solutions of the Schrodinger equation to some model systems viz Particle in a box, the harmonic oscillator, the rigid rotator, the hydrogen atom.

UNIT –II

BASICS OF THERMODYNAMICS: Maxwell's thermodynamic relations, Vant's Hoff hypothesis. Partial molar volume and partial molar heat content. Chemical potential, Gibbs-Duhem equation, variation of chemical potential with temperature and pressure. Chemical potential of ideal gases, pure solids, liquids and mixture of ideal gases. Activity and Fugacity, Determination of Fugacity, Variation of Fugacity with Temperature and Pressure.

UNIT –III

ELECTROCHEMISTRY–I: Electrochemistry of solution. Debye-Huckel Onsager treatment and its extension, ion solvent interactions. Debye-Huckel Limiting Law. Debye-Huckel theory for activity coefficient of electrolytic solutions. Determination of activity and activity coefficient, ionic strength, Thermodynamics of electrified interface equations. Derivation of electro-capillarity, Lippmann equation (surface excess), methods of determination.

UNIT –IV

CHEMICAL DYNAMICS –I: Methods of determining rate laws, consecutive reactions, collision theory of reaction rates, steric factor, Activated complex theory, kinetic salt effects, steady state kinetics, and thermodynamic and kinetic control of reactions. Dynamic chain (Hydrogen-bromine and Hydrogen-chlorine reactions) and Oscillatory reactions (Belousov-Zhabotinsky reaction etc.)

BOOKS SUGGESTED :

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Coulson's Valence, R. McWeeny, ELBS.
3. Chemical Kinetics, K. J. Laidler, Pearson.
4. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose, McMillan.
5. Modern Electrochemistry Vol. I and Vol. II, J.O.M. Bockris and A.K.N. Reddy, Plenum.
6. Thermodynamics for Chemists, S. Glasstone EWP.
7. An Introduction to Electrochemistry S. Glasstone EWP.
8. Organic Chemist's Book of Orbitals. L. Salem and W.L. Jorgensen, Academic Press
9. The Physical Basis of Organic Chemistry, H. Maskill, Oxford University Press

PAPER NO 4. CH - 104

THEORY AND APPLICATIONS OF SPECTROSCOPY- I

Max. Marks 80

UNIT - I

UNIFYING PRINCIPLES:

Electromagnetic radiation, interaction of electromagnetic radiation with matter-absorption, emission transmission, reflection, dispersion, polarization and scattering, Uncertainty relation and natural line width and natural line broadening, transition probability, selection rules, intensity of spectral lines, Born-Oppenheimer approximation, rotational, vibrational and electronic energy levels. Region of spectrum, representation of spectra, F.T. spectroscopy, computer averaging, lasers.

UNIT- II

MICROWAVE SPECTROSCOPY:

Classification of molecules in term of their internal rotation mechanism, determination of rotation energy of diatomic and polyatomic molecules, intensities of rotational spectral lines, effect of isotopic substitution on diatomic and polyatomic molecules, intensities of rotational spectral lines and parameters of rotational energy of linear and the transition frequencies, non-rigid rotators, spectral lines and parameters of rotational energy of linear and symmetric top polyatomic molecules. Application in determination of bond length.

UNIT- III

INFRA RED SPECTROSCOPY:

Introduction, simple and anharmonic oscillators in vibrational spectroscopy, diatomic-vibrating rotator, Modes of vibration in polyatomic molecules, vibration-coupling, Fourier Transform IR spectroscopy: instrumentation, interferometric spectrophotometer, sample handling, Factors influencing vibrational frequencies, Application of IR spectroscopy: Interpretation of IR spectra of normal alkanes, aromatic hydrocarbons, alcohols, phenols, aldehydes, ketones, ethers, esters, carboxylic acids, amines and amides.

UNIT- IV

RAMAN SPECTROSCOPY:

Classical and quantum theories of Raman effect, pure rotational, vibrational and vibrational-rotational Raman spectra, selection rules, mutual exclusion principle, Resonance Raman spectroscopy, Coherent anti Stokes Raman spectroscopy (CARS), Instrumentation , Application of Raman effect in molecular structures, Raman activity of molecular vibration, structure of CO_2, H_2O, N_2O, SO_2, NO_3^-, ClF_3.

BOOKS SUGGESTED

1. Modern Spectroscopy, J.M. Hollas, John Wiley.
2. Fundamentals of Molecular Spectroscopy, C.N. Banwell.
3. Spectroscopy, B.K. Sharma, Goel Publication.
4. Organic Spectroscopy: Principles and Applications, Jag Mohan, Narosa Publication.
5. Spectroscopy Methods in Organic Chemistry, D.H. Williams & I. Fleming, Tata Mcgraw-Hill Publication.
6. Spectrophometric Identification of Organic Compounds, R.M. Silversteion & F. X. Webster, John Wiley Publication.

SECOND SEMESTER

PAPER NO1 . CH - 201

TRANSITION METAL COMPLEXES

Max. Marks 80

UNIT - I

REACTION MECHANISM OF TRANSITION METAL COMPLEXES: Energy profile of a reaction, reactivity of metal complexes, inert and labile complexes, kinetic application of valence bond and crystal field theories, kinetics of octahedral substitution, anation reactions, reactions without metal ligand bond cleavage. Substitution reactions in square planar complexes, the trans effect. Redox reactions, electron transfer reactions, mechanism of one electron transfer reactions, outer sphere type reactions, cross reactions and Marcus-Hush theory, inner sphere type reactions.

UNIT - II

ELECTRONIC SPECTRA AND MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES:

Spectroscopic ground states, Correlation, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), Selection rules, mechanism for break down of the selection rules, intensity of absorption, band width, spectra of d-d metal complexes of the type $[M(H_2O)]^{n+}$, spin free and spin paired ML_6 complexes of other geometries, Calculations of Dq, B and parameters, spin forbidden transitions, effect of spin-orbit coupling, Spectrochemical and Nephelauxetic series. Magnetic properties of complexes of various geometries based on crystal field model, spin free-spin paired equillibria in octahedral stereochemistry.

UNIT - III

A. **TRANSITION METAL COMPLEXES:** Transition metal complexes with unsaturated organic molecules, alkanes, allyl, diene dienyl, arene and trienyl complex, preparations, properties, nature of bonding and structure features. Imporant reaction relating to nucleophilic and electrophilic attack on ligands and organic synthesis.

B. **TRANSITION METALS COMPOUND WITH BOND TO HYDROGEN:** Transition Metals Compounds with Bond to Hydrogen.

UNIT-IV

A. **ALKYLS AND ARYLS OF TRANSITION METALS:** Types, routes of synthesis, stability and decomposition pathways, organocopper in organic synthesis.

B. **COMPOUNDS OF TRANSITION METAL - CARBON MULTIPLE BONDS :** Alkylidenes, low valent carbenes, nature of bond and Structural characteristics.

C. **FLUXIONAL ORGANOMETALLIC COMPOUNDS:** Fluxionality and dynamic equilibria in compounds such as olefin, -allyl and dienyl complexes.

BOOKS SUGGESTED :

1. Principles and applications of organotransition metal chemistry, J.P.Collman, L.S.Hegsdus, J. R. Norton and R.G. Finke, University Science Books.
2. The Organometallic chemistry of the Transition metals, R. H. Crabtree, John Wiley.
3. Metallo - organic chemistry, A.J. Pearson, Wiley.
4. Organometallic chemistry, R.C. Mehrotra and A. Singh, New age International.

PAPER NO 2. CH - 202

REACTION MECHANISMS

Max. Marks 80

UNIT - I

A. **ALIPHATIC NUCLEOPHILIC SUBSTITUTION:** The S_N2, S_N1, mechanisms. The neighbouring group mechanism, neighbouring group participation by π and σ bonds, anchimeric assistance. Reactivity effects of substrate structure, attacking nucleophile, leaving group and reaction medium, ambident nucleophile and regioselectivity.

B. **AROMATIC NUCLEOPHILIC SUBSTITUTION:** The S_N1, S_N2 mechanisms. Reactivity effect of substrate structure, leaving group and attacking nucleophile. The von Richter, Sommelet-Hauser, and Smiles rearrangements.

UNIT - II

A. **ALIPHATIC ELECTROPHILIC SUBSTITUTION:** Mechanisms of- S_E2 S_E1, electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and the solvent polarity on the reactivity.

B. **AROMATIC ELECTROPHILIC SUBSTITUTION:** The arenium ion mechanism, orientation and reactivity.

The ortho/para ratio, ipso attack, orienation in other ring systems.Θ Reactivity-Effect of substrates and electrophilles. Vilsmeir reaction and Gattermann-Koch reaction.

UNIT - III

ADDITION TO CARBON-CARBON MULTIPLE BONDS: Mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radicals, regio- and chemoselectivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings Hydroboration, Micheal reaction. Shrapless asymetric epoxdation.

UNIT - IV

ADDITION TO CARBON-HETERO MULTIPLE BONDS: Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, acids esters and nitriles.Addition of Grignard Reagents, Organo-Zinc and Organo-lithium to carbonyls and unsaturated carbonyl compounds, Wittig reaction.

Mechanism of condensation reactions involving enolates - Aldol, Knoevenagel and Stobbe reactions. Hydrolysis of esters and amides, ammonolysis of esters.

BOOKS SUGGESTED :

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March,Johan Wiley.
2. Modern Organic Reactions, H. O. House, Benjamin.
3. Principles of Organic Synthesis, R. O. C. Norman and J. M. Coxon, Blackle Academic & Professional.
4. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
5. Structures and Mechanism in Organic Chemistry, C. K. Ingold, Cornell University Press.
6. Reaction Mechanism in Organic Chemistry, S. M. Mukherji and S. P. Singh, Macmillian

PAPER NO 3. CH –203

QUANTUM CHEMISTRY, THERMODYNAMICS AND CHEMICAL DYNAMICS - II

Max. Marks 80

UNIT –I

A. **APPLICATION OF MATRICES IN QUANTUM CHEMISTRY:** Addition and multiplication, inverse and transpose of matrices, Determinants, in quantum Chemistry.

B. **ANGULAR MOMENTUM IN QUANTUM CHEMISTRY:** Angular momentum, angular momentum Operators. Eigen functions and Eigen values Angular momentum, ladder operators.

C. **APPROXIMATE METHODS:** The variation theorem, linear variation principle. Perturbation theory (first order and non-degenerate). Applications of variation method and perturbation theory to the Helium atom.

UNIT –II

STATISTICAL THERMODYNAMICS: Probability, permutations and combinations concepts of probability, Maxwell Boltzmann distribution. Different ensembles and Partition functions translational, rotational, vibrational and Electronic. Thermodynamic function using appropriate Partition function. Fermi-Dirac and Bose-Einstein Statistics and statistical basis of entropy. Heat capacity of solids, Debye and Einstein Models.

UNIT –III

ELECTROCHEMISTRY –II: Structure of electrified interfaces. Gouy-Chapman, Stern, Over potentials and exchange current density, Derivation of Butler –Volmer equation, Tafel plot. Semiconductor interfaces, Theory of double layer at semiconductor, electrolyte solution interfaces, structure of double layer interfaces. Effect of light at semiconductor solution interfaces. Electro catalysis influence of various parameters. Hydrogen electrode.

UNIT –IV

CHEMICAL DYNAMICS –II: General features of fast reactions by flow method, relaxation method, flash photolysis and the nuclear magnetic resonance method. Molecular reaction dynamics, Dynamics of molecular motions, probing the transition state, dynamics of barrierless chemical reactions in solutions, dynamics of unimolecular reaction. [Lindemann –Hinshelwood , RRK and Rice-Ramsperger-Kassel-Marcus {RRKM}] theories of unimolecular reactions.

BOOKS SUGGESTED :

1. The Chemistry Mathematics Book, E. Steiner, Oxford University Press.
2. Mathematics for Chemistry, Doggett and Sutcliffe, Longman.
3. Mathematical Preparation for Physical Chemistry, F. Daniels, McGraw Hill.
4. Chemical Mathematics, D.M, Hirst, Longman.
5. Applied Mathematics for Physical Chemistry, J.R. Barrante, Prentice Hall.
6. Basic Mathematics for Chemists, Tebbutt, Wiley.
7. Physical Chemistry, P.W. Atkins, ELBS.
8. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill.
9. Quantum Chemistry, Ira N. Levine, Prentice Hall.
10. Coulson's Valence, R. McWeeny, ELBS.
11. Chemical Kinetics, K. J. Laidler, Pearson.
12. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose, McMillan.
13. Modern Electrochemistry Vol. I and Vol. II, J.O.M. Bockris and A.K.N. Reddy, Plenum.
14. Thermodynamics for Chemists, S. Glasstone EWP.
15. An Introduction to Electrochemistry S. Glasstone EWP.
16. Physical Chemistry, Ira N. Levine McGraw Hill.
17. Physical Chemistry, Silbey, Alberty, Bawendi, John-Wiley.

PAPER NO 4 . CH - 204

THEORY AND APPLICATIONS OF SPECTROSCOPY –II

Max. Marks 80

UNIT - I

ULTRAVIOLET AND VISIBLE SPECTROSCOPY:

Introduction, intensity of vibrational-electronic spectra and Frank-Condon principle for dissociation energy, rotational fine structure of electronic-vibrational spectra, Shape of some molecular orbitals viz., H_2, He_2, N_2, O_2. Electronic spectra of organic molecules, chromophores, application of electronic spectroscopy: spectrophotometric studies of complex ions, determination of ligand/metal ratio in a complex, identification of compounds, determination of stability constants.

UNIT -II

SCATTERING SPECTROSCOPY:

Principle, instrumentations and application of Auger spectroscopy, Scanning Electron Microscopy, Electron diffraction of gases and vapours, The Wierl equation and co-related method.

Theory, instrumentation and application of turbidimetry, nephelometry, fluorometry. Fluoroscence and phosphorescence and factors affecting them.

UNIT - III

MASS SPECTROMETRY:

Introduction, basic principles, separation of the ions in the analyzer, resolution, molecular ion peak, mass spectral fragmentation of organic compounds, factors affecting fragmentation, McLafferty rearrangement. Instrumentation, Characteristics of mass spectra of Alkanes, Alkenes, Aromatic hydrocarbons, Alcohols, Amines. Nitrogen rule, ring rule, Molecular weight and formula determination, Gas chromatography-Mass spectrometry.

UNIT - IV

NUCLEAR RESONANCE SPECTROPHOTOMETRY:

Theory of NMR spectroscopy, interaction of nuclear spin and magnetic moment, chemical shift, processional motion of nuclear particles in magnetic field, spin-spin splitting, coupling constants, factor affecting the chemical shift, shielding effect, effect of chemical exchange, hydrogen bonding, instrumentation of Fourier transform NMR spectrophotometer, structure determination of organic compounds, Carbon-13 NMR spectroscopy, Multiplicity-proton (^1H) decoupling-noise decoupling, off resonance decoupling, selective proton decoupling, chemical shift.

BOOKS SUGGESTED

1. Modern Spectroscopy, J.M. Hollas, John Wiley.
2. Fundamentals of Molecular Spectroscopy, C.N. Banwell.
3. Spectroscopy, B.K. Sharma, Goel Publication.
4. Organic Spectroscopy ; Principles and Application, Jag Mohan, Narosa Publication.
5. Spectroscopic Methods in Organic Chemistry, D.H. Williams & I. Fleming, Tata Mcgraw-Hill Publication.
6. Spectrophometric Identification of Organic Compounds, R.M. Silverstein & F.X. Webster, John Wiley Publications.

THIRD SEMESTER

PAPER NO 1. CH - 301

RESONANCE SPECTROSCOPY, PHOTOCHEMISTRY AND ORGANOCATALYSIS

Max. Marks 80

UNIT –I

A. **ELECTRON SPIN RESONANCE SPECTROSCOPY:** Hyperfine coupling, spin polarization for atoms and transition metal ions, spin-orbit coupling and significance of g-tensors, application to transition metal complexes (having one unpaired electron).

B. **NUCLEAR QUADRUPOLE RESONANCE SPECTROSCOPY:** Quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant, splitting, applications.

UNIT –II

A. **PHOTOELECTRON SPECTROSCOPY:** Basic principle both for atoms and molecules; Photo-electric effect, ionization process, Koopman's theorem, Spectra of simple molecules, Auger electron spectroscopy, Determination of Dipole moment.

B. **PHOTOACOUSTIC SPECTROSCOPY:** Basic principle of Photo acoustic Spectroscopy (PAS), PAS – gases and condensed system Chemical and Surface application.

UNIT –III

A. **PHOTOCHEMICAL REACTIONS :** Interaction of electromagnetic radiation with matter, Photophysical processes , Stern Volmer equation, types of excitations, fate of excited molecule, quantum yield, transfer of excitation energy, Actinometry.

B. **DETERMINATION OF REACTION MECHANISM:** Classification, rate constants and life times of reactive energy states –determination of rate constants of reactions. Effect of light intensity on the rate of photochemical reactions.

C. **MISCELLANEOUS PHOTOCHEMICAL REACTIONS:** Photo-Fries reactions of anilides, Photo-Fries rearrangement. Barton reaction. Singlet molecular oxygen reactions. Photochemical formation of smog. Photodegradation of polymers, Photochemistry of vision.

UNIT –IV

A. **ORGANOCATALYSIS**

General Principles: Energetic, Catalytic cycles, catalytic efficiency and life time, selectivity. Type of organometallic reaction: Ligand substitution, Oxidative addition, reductive elimination and insertion and deinsertion. Homogeneous catalysis: Hydrogenetion of alkenes, Hydroformylation, Monsanto acetic acid synthesis, Wacker oxidation of alkenes, Alkenes metathesis, Palladium-Catalysed C-C bond forming reactions, asymmetric oxidation. Heterogenous catalysis: The nature of heterogenous catalysts, Fischer- Tropsch synthesis, alkene polymerization.

BOOK SUGGESTED:

1. Infrared and Raman Spectra: Inorganic and Coordination Compounds, K. Nakamoto, Wiley.
2. Fundamentals of Photochemsitry, K.K. Rohtagi-Mukherji, Wiley-Eastern.
3. Essentials of Molecular Photochemistry, A. Gilbert and J. Baggott, Blackwell Scientific Publications.
4. Molecular Photochemistry, N.J. Turro, W.A. Benjamin.
5. Introductory Photochemistry, A. Cox and T. Camp, McGraw-Hill.
6. Photochemistry, R.P. Kundall and A. Gilbert, Thomson Nelson.
7. Application of Spectroscopy of Organic Compounds, J.R. Dyer, Prentice Hall.
8. Photochemistry, R.P. Kundall and A. Gilbert, Thomson Nelson.
9. Organic Photochemistry, J. Coxon and B. Halton, Cambridge University Press.
10. Shriver & Atkins Inorganic Chemistry; P.Atkins, T.Overtone, J. Rourke, M. Weller, F. Armstrong, Oxford University Press
11. Inorganic Chemistry: C.E. Housecraft, A.G. Sharpe, Pearson Education Limited.
12. Inorganic Chemistry: Principles of Structure and Reactivity: J.E. Huheey, E.A. Keiter, R.L.Keiter, O.K. Medhi, Pearson Education
13. Organometallic Chemistry: A Unified Approach: R.C. Mehrotra, A.Singh, New Age International Publishers.

PAPER NO 2. CH - 302

CHEMISTRY OF BIOMOLECULES

Max. Marks 80

UNIT –I

A. **BIOENERGETICS:** Standard free energy change in biochemical reactions, exergonic, endergonic. Hydrolysis of ATP, synthesis of ATP from ADP.

B. **ELECTRON TRANSFER IN BIOLOGY:** Structure and function of metalloproteins in electron transport processes –cytochromes and ion-sulphur proteins, synthetic models.

C. **TRANSPORT AND STORAGE OF DIOXYGEN:** Heme proteins and oxygen uptake, structure and function of haemoglobin, myoglobin, haemocyanins and haemerythrin, model synthetic complexes of iron, cobalt and copper.

UNIT –II

A. **METALLOENZYMES:** Zinc enzymes –carboxypeptibase and carbonic anhydrase. Iron enzymes – catalase, peroxidase and cytochrome P-450. copper enzymes- superoxide dismutase. Molybdenum oxatransferase enzymes –xanthine oxidase.

B. **ENZYME MODELS:** Host-guest chemistry, chiral recognition and catalysis, molecular recognition, molecular asymmetry and prochirality. Biomimetic chemistry, Cyclodextrin-based enzyme models, calixarenes, ionophores, synthetic enzymes or synzymes.

UNIT –III

A. **ENZYMES :** Nomenclature and classification of Enzyme. Induced fit hypothesis, concept and identification of active site by the use of inhibitors.

B. **CO-ENZYME CHEMISTRY:** Structure and biological functions of coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD+, NADP+, FMN, FAD, lipoic acid, vitamin B_{12}.

C. **BIOTECHNOLOGICAL APPLICATIONS OF ENZYMES:** Techniques and methods of immobilization of enzymes, effect of immobilization on enzyme activity, application of immobilization enzymes in medicine and industry. Enzymes and Recombinant DNA Technology.

UNIT –IV

A. **BIOPOLYMER INTERACTIONS:** forces involved in biopolymer interaction. Electrostatic charges and molecular expansion, hydrophobic forces, dispersion force interactions. Multiple equilibria and various types of binding processes in biological systems. Hydrogen ion titration curves.

B. **THERMODYNAMICS OF BIOPOLYMER SOLUTIONS:** Thermodynamics of biopolymer solution, osmotic pressure, membrane equilibrium, muscular contraction and energy generation in mechnochemical system.

C. **CELL MEMBRANE AND TRANSPORT OF IONS:** Structure and functions of cell membrane, ion transport through cell membrane, irreversible thermodynamic treatment of membrane transport and Nerve conduction.

BOOK SUGGESTED:

1. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
2. Bioinorganic Chemistry, I. Bertini, H.B. Gray, S.L. Lippard and J.S. Valentine, University Science Books.
3. Inorganic Biochemistry vols II and I.Ed G.L. Eichhorn, Elservier.
4. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
5. Bioinorganic Chemistry, I. Bertinin, H.B. Gary, S.J. Lippard and J.S. Valentine, University Science.
6. Inorganic Biochemistry vols I and II ed. G.L. Eichhorn, Elsevier.
7. Bioorganic Chemistry: A Chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer-verlag.
8. Understanding Enzymes, Trevor palmer, Prentice Hall.
9. Enzyme Chemistry : Impact and Applications, Ed. Collin J Suckling, Chapman and Hall.
10. Enzyme Mechanisms Ed, M.I. Page and A. Williams, Royal Society of Chemistry.
11. Fundamentals of Enzymology, N.C. Price and L. Stevens, Oxford University Press.
12. Immobilizaed Enzymes: An Introduction and Applications in Biotechnology, Michael D. Trevan, and John Wiley.

13. Enzymatic Reaction Mechanisms, C. Walsh, W.H. Freeman.
14. Enzyme Structure and Mechanisms, A Fersht, W.H. Freeman.
15. Biochemistry: The Chemical Reacitons of liging cells, D.E. Metzler, Academic Press.
16. Principles of Biochemistry, A.L. Lehninger, Wroth Publishers.
17. Biochemistry, L. Stryer, W.H. Freeman.
18. Biochemistry, J. David Rawn, Neil Patterson.
19. Biochemistry, Voet and Voet, John Wiley.
20. Outlines of Biochemistry, E.E. Conn and P.K. Stumpf, John Wiley.
21. Bioorganic Chemistry : A Chemistry Approach to Enzyme Action, H. Dugas and C. Penny, Springer-Verlag.
22. Biochemistry and Molecular Biology of Plants, Buchanan, Gruissem and Jones, I.K. International Pvt. Ltd.

PAPER NO 3. CH –303

CATALYSIS, SOLID STATE AND SURFACE CHEMISTRY

Max. Marks 80

UNIT –I

ACIDS, BASES, ELECTROPHILES, NUCLEOPHILES AND CATALYSIS:

Acid-base dissociation, Electronic and structural effects, acidity and basicity. Acidity function and their applications. Hard and soft acids and bases. Nucleophilicity scales. Nucleofugacity. The alpha effect. Ambivalent Nucleophilies. Acid base catalysis-specific and general catalysis. Bronsted catalysis, Enzyme Catalysis.

UNIT –II

MICELLES AND ADSORPTION :

Micelles : Classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of Surfactants. Thermodynamics of micellization - phase separation and mass action models. Reverse micelles, micro-emulsion. Micellar Catalysis, Surface tension capillary action, pressure difference across curved surface (Laplace equation), vapor pressure of droplets (Kelvin equation), Gibbs adsorption isotherm.

UNIT –III

SOLID STATE CHEMISTRY - I :

Crystal defects and Non-stoichiometry - Perfect and imperfect crystals, intrinsic and extrinsic defects - point defect, line and plane defects, vacancies - Schottky defects and Frankel defects. Thermodynamics of Schottky and Frenkel defect, formation of color centres, non-stoichiometry and defects. Electronic properties and Band theory of semiconductors.

UNIT –IV

MACROMOLECULES :

Polymer - Definition types of polymers, electrically conducting, fire resistant, liquid crystal polymers, kinetics of polymerization, mechanism of polymerization.

Molecular mass and average molecular mass. Molecular mass determination (Osmometry, Viscometry, diffusion and light scattering methods), Sedimentation, chain configuration of macromolecules, calculation of average dimensions of various chain structures.

BOOK SUGGESTED :

1. G.W. Castellan, "Physical Chemistry", Addison- Lesley Publishing Co.
2. E.A. Moelwyn Hughes, "Physical Chemistry", Pergamon Press.
3. Denbigh, "Chemical Equilibria", D. Van Nostrand.
4. J. Rose, "Dynamic Physical Chemistry" Sir Issac Pitman and Sons.
5. Solid state "Chemistry and its Applications, A.R. West, Plenum.
6. Principle of Solid State H.V. Kar, Wiley Eastern.
7. Solid State Chemists, D.K. Chakrabarty, New Age International (P) Ltd.
8. Micelles, Theoretical and Applied Aspects, V. Moral Plenum.
9. The Chemistry Mathematics Book, E. Steiner, Oxford University Press.
10. Mathematics for Chemistry, Doggett and Sutcliffe, Longman.
11. Mathematical Preparation for Physical Chemistry, F. Daniels, McGraw Hill.
12. Chemical Mathematics, D.M. Hirst, Longman.
13. Applied Mathematics for Physical Chemistry, J.R. Barrante, Prentice Hall.
14. Basic Mathematics for Chemists, Tebbutt, Wiley.
15. Quantum Chemistry, Ira N. Levine, Prentice Hall.
16. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill.

PAPER NO 4. CH –304

ANALYTICAL TECHNIQUES AND DATA ANALYSIS

Max. Marks 80

UNIT –I

SAMPLE PREPARATION, DEGESTION AND STATISTICAL ANALYSIS

A. Sampling - Collection, Preservation and preparation of sample, Techniques of sampling of solid, liquid and gaseous samples, Operation of drying and preparing a solution of the analyte.

Principle, methodology and application of different types of digestions such as acid digestion, base digestion, enzymatic and microwave digestion for liquid and solid materials.

B. Evolution and procession of Analytical Data, Precision and Accuracy, Types of Errors, Propagation of errors, Normal Distribution Curve, Standard deviation, Confidence limit, Graphical presentation of result-method of average, Method of Linear least square, Significant figures, Statistical aid to hypothesis of testing- t-test, F-test, Correlation coefficient, Rejection of data.

UNIT –II

SEPARATION TECHNIQUES

A. Principle of Solvent Extraction, Methods of Extraction, Efficiency of extraction, Selectivity of extraction, applications.

B. Principle, classification of chromatographic techniques, Technique and applications of paper chromatography, Thin-layer chromatography, HPTLC, Column chromatography.

UNIT –III

THERMAL AND AUTOMATED METHODS

A. Principle, Instrumentation, Applications of TGA, DTA and DSC methods.

B. Automated methods, Principle, instrumentation and application of flow injection analysis.

UNIT –IV

ELECTROCHEMISTRY

A. Principles and instrumentation of pH potentiometry, coulometry and counductometry.

B. Basic principles, Diffusion current, polarized electrode, Micro electrode, Dropping Mercury Electrode Ilkovic equation, Polarographic wave, Qualitative analysis Stripping methods, Cyclic Voltammetry, Amperometric titration :-curves, Differential pulse polarography and Square wave polarography.

BOOK SUGGESTED :

1. Fundamental of Analytical Chemistry- Skoog D.A. and West D.M.
2. Saunders, College Publication.
3. Textbook of Quantitative Inorganic Analysis-Vogel A.I.
4. Principles and Practice of Analytical Chemistry-Fifield F.W and Kealey
5. D. Black well Science
6. Instrumental Analysis R. Braun, McGraw Hill, International Edition.
7. Analytical Chemistry, Christian, G.D., WSE/Wiley.
8. Instrumental Analysis, Willard Meritt Dean, CBS.
9. Chemical Analysis, Brawn, McGraw Hill.
10. Fundamental of Analytical Chemistry-Skoog D.A. and West D.M.
11. Principles of instrumental analysis, Skoog Holler - Niemann.
12. Instrumental analysis, Wizard Dean and Merit.
13. Principle and PRACTICAL analytical chemistry, Fifield and Kealey.

FOURTH SEMESTER

PAPER NO 1. CH - 401

INSTRUMENTAL METHODS OF ANALYSIS

Max. Marks 80

UNIT –I

ADVANCED CHROMATOGRAPHY:

A. Ion chromatography: Ion exchange equilibrium, Ion-exchange packing and Inorganic Applications.

B. Size exclusion chromatography: Column packing, Theory of size of exclusion chromatography and applications.

C. Supercritical fluid chromatography: Properties of supercritical fluid SFC-Instrumentation and operating variables, comparison with other types of chromatography, applications.

D. Capillary Electrophoresis and capillary electro chromatography : overviews and applications

UNIT –II

X-RAY AND PROTON INDUCED SPECTROSCOPY:

A. X-Ray fluorescent method: Principles-Characteristics x-ray emission. Instrumentation x-ray tube, Radioactive sources. Wavelength dispersive instruments. Energy dispersive instruments. Analytical Applications-Qualitative Analysis.

B. Proton Induced X-Ray Spectroscopy : Theory, instrumentation and application.

UNIT –III

ATOMIC EMISSION SPECTROSCOPY

A. Selectivity, sensitivity and interferences of atomic spectroscopy.

B. Theory, instrumentation and application of flame photometer, AES, ICP-AES and AFS.

UNIT –IV

ATOMIC ABSORPTION SPECTROSCOPY AND HYPHENATED TECHNIQUES

A. Theory instrumentation and application of flame and graphite furnace AAS, cold-vapor and hydride generation AAS.

B. Theory, instrumentation and application of hyphenated techniques i.e. GC/HPLC/-MS, GC/IC/HPLC-ICP-MS.

BOOK SUGGESTED:

1. Instrumental methods of analysis, Willard, Meritt and Dean.
2. Basic concepts of analytical chemistry, S.M. Khopkar, John Wiley & Sons.
3. Metallurgical analysis, S.C. Jain.
4. Material Science and Engineering. An Introduction, W.D. Callister, Wiley.
5. Material Science, J.C. Anderson, K.D. Leaver, J.M. Alexander and R.D. Rawlings, ELBS.
6. Fundamentals of Analytical Chemistry, Skoog, Welt, Holler and Crouch Thomson Learning Inc.

PAPER NO 2. CH - 402
NATURAL PRODUCT AND MEDICINAL CHEMISTRY

Max. Marks 80

UNIT-I

A. **Terpenoids and Carotenoids:** Classification, nomenclature, occurrence, isolation, general methods of structure determination of Citral, Geraniol, α-Terpeneol, Menthol, Farnesol, Zingiberene, Santonin, Phytol, Abietic acid and β – Carotene.

B. **Alkaloids:** Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on Nitrogen heterocyclic ring, role of alkaloids in plant. Synthesis and biosynthesis of the following: Ephedrine, (+)- Coline, Nicotine, Atropine, Quinine and Morphine.

UNIT-II

A. **Steroids:** Isolation, structure determination and synthesis of Cholesterol, Bile acids, Androsterome, Testosterone, Esterone, Progestrone, Aldostrone and Biosythesis of cholesterol.

B. **Plant Pigments**: Occurrence, nomenclature and general method of structure determination. Isolation and synthesis of Apigenin, Luteolin, Quercetin, Myrcetin, Quercetin-3-glucoside, Vitexin, Diadzine, Butein, Aureusin, Cyanidin-7-arebinoside, Cyanidin, Hirsutidin.

UNIT- III

Drug Design

A. Development of new drugs procedures followed in drug design, concepts of lead compound and lead modification, concepts of prodrugs and soft drugs, Structure-Activity Relationship (SAR), Factors affecting bioactivity, resonance, inductive effect. Theories of drug activity: occupancy theory, rate theory, induced fit theory. Quantitative Structure Activity Relationship (QSAR).

B. Concepts of drug receptors, lipophilicity, phamacophore, pharmacological activity and typical range of parameters related to drug likeness.

C. General introduction of pharmacokinetics and pharmacodynamics.

UNIT – IV

A. **Anteoplastic Agents**: Introduction, Alkylating agents, antimetabolites, carcinolytic antibiotics, mitotic inhibitors.

B. **Antibiotics**: Constitution and synthesis of penicillins, chloramphenicol, tetracycline and streptomycin.

C. **Antimalarials**: Synthesis and properties of the following Antimalarial: 8-amino quinolone derivatives-Pamaquine, Primapune, Pentaquinr, Isopentaquine, 4- amino quinolone derivatives-Santoquine, Camaquine, Acridine derivatives-Mepracrine, Azacrin, Pyrimidine and Biguanid derivatives- Paludrine Pyremethamine.

Book Suggested:

1. Natural Products: Chemistry and Biological Significance, J. Mann, R. S. Davidson, J. B. Hobbs.
2. D. V. Banthrope and J. B. Harbrone, Longman, Essex., Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
3. Chemistry, Biologcal and Pharmacological properties of Medicinal Plants from the Americans, Ed. Kurt Hostettmann, M. P. Gupta and A. Marston, Harwood Academic Publishers.
4. Introduction to Flavonoids, B. A. Bhom, Harwood Academic Publishers.
5. New Trends in Natural Product Chemistry, Att-ur-Rahman and M. I. Choudhary, Harwood, Academic Publishers.

6. Insecticides of Natural Origin, Sukh Dev, Harwood Academic Publishers.
7. Introduction to medicinal Chemistry, A Gringuage, Wiley-VCH.
8. Burger's Medicinal Chemistry-1 (Chapter-9 and Ch- 14), Drug Ed. M. E. Discovery, Wolff, John Wiley.

PAPER NO 3. CH - 403

MATERIAL AND NUCLEAR CHEMISTRY

Max.Marks 80

UNIT- I

NON EQUILIBRIUM THERMODYNAMICS: Fundamental concepts, Forces and Fluxes, Entropy production, Phenomenological Laws and Onsager's r for biological systems, coupled reactions.

UNIT- II

MATERIAL CHEMISTRY:

Preparation and Properties of Nanoparticles, Materials-Metals, Ceramics (Oxide, carbides, sulphides, nitrides). Physical and chemical Methods, Size and Shape controlled Synthesis, Sol-gel methods, Optical Properties, Electrical and Magnetic Properties, Application of Nanoparticles. Characterization of Nanoparticles (SEM, TEM etc.)

UNIT-III

SUPRAMOLECULAR CHEMISTRY:

Properties of covalent bonds, bond length, inter bond angles, Force constant, bond and molecular dipole moment, molecular and bond polarizability.

Intermolecular Forces, hydrophobic effects, Electro static, induction, dispersion and resonance energy, Hydrogen bond, Magnetic interactions. Principles of molecular association ad organization Biological marcomolecules, Molecular receptors and design principal, cryptands, Cyclophanes, calixeranes and cyclodextrins. Supramoleular reactivity and catalysis.

UNIT-IV

NUCLEAR AND RADIOCHEMISTRY

NUCLEAR THEORY :

Nuclear cross section and nuclear radii, nuclear shells and magic numbers, theory of nuclear shell model, nuclear potentials, square well and simple harmonic oscillator potentials, application, liquid drop model, semi-empirical mass equation, application and limitations.

NUCLEAR FISSION :

Mass, energy and charge distribution of fission products, decay chains, prompt and neutrons, liquid drop model of nuclear fission.

NUCLEAR ENERGY :

Nuclear fission, chain reaction, multiplication factor, nuclear reactors

APPLIED RADIOCHEMISTRY :

Radioactive isotopes, purity and strength of radioisotopes. Radiochemical principle in the use of tracers, Application of Tracers in Chemical investigations, Physico-chemical methods, Analytical applications, Age determinations, Medical applications, Agricultural application.

BOOKS SUGGESTED:

1. Nuclear and Radiochemistry by G. Friedlander, J.W. Kennedy & J.M. Miller, John Willey and Sons, New York.
2. Source Book an Atomic Energy – S. Glasstone, Affiliated East –West Press Pvt. Ltd. New Delhi.
3. Nuclear Physics by I. Kaplan, Addision –Willey Publishing company, London.
4. Nuclear Chemistry and its applications, M. Haissinsky, Addision –Welsley, Publishing Company, London.
5. Essentials of Nuclear chemistry, H.J. Arnikar, Wiley Eatern Ltd, New Delhi.
6. Molecular Mechanics, U. Burkert and N.L. Allinger, ACS Monograph 177, 1982.
7. Mechanism and Theory in Organic Chemistry, T.H. Lowry and K.C. Richardson, Harper and Row.
8. Introduction to Theoretical Organic Chemistry and Molecular Modelling, W.B. Smith, VCH, Weinheim.
9. Physical Organic Chemistry, N.S. Isaacs, ELBS./ Longman.
10. Supramolecular Chemistry: concept and Perspectives, J.M. Lehn, VCH.
11. The Chemistry Mathematics Book, E. Steiner, Oxford University Press.
12. Chemical Mathematics, D.M, Hirst, Longman.
13. Applied Mathematics for Physical Chemistry, J.R. Barrante, Prentice Hall.
14. Quantum Chemistry, Ira N. Levine, Prentice Hall.
15. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill.

PAPER NO 4. CH - 404

ENVIRONMENTAL & APPLIED CHEMICAL ANALYSIS

Max. Marks 80

UNIT –I

AIR POLLUTION MONITORING AND ANALYSIS

Classification of air pollution monitoring levels, air quality, standards and index, monitoring and analysis of selected air borne pollutants: SO_2, NO_x, SPM, VOC's, Pb, CO_2, POP's, Hg, carbon and ozone. Air pollution control devices Viz ESP, scrubber technique, baghouse filters etc. Atmospheric chemistry of acid rains, photochemical smog, green house effect, global warming, ozone hole.

UNIT –II

SOIL AND WATER POLLUTION

Soil and water quality standards, monitoring and analysis of selected soil water contaminants: COD, pesticides, heavy metals, POPs, fluoride, cyanide, nitrate, phosphate, oil & grease, Geobiochemical impact of municipal solid waste, steel plants effluent, domestic sewage. Control devices of water pollutants.

UNIT –III

FOOD ANALYSIS

A. Introduction to general Constituents of food, Proximate Constituents and their analysis, Additives- Introduction -Types - Study of preservatives colors and Antioxidants and method of estimation, adulteration - Introduction, Types, Test for adulterants.

B. Introduction standards composition and analysis of following foods : Wheat, Bread, Biscuits, Jam, Jelly, Honey, Milk, Ice Cream, Butter, Cheese, Milk Powder, Oils and Fats, Tea, Coffee, Soft drinks, Alcoholic beverages, Cereal and pulses, Confectionery, Fruits, Vegetables, Egg, Fish, Meat.

UNIT –IV

COSMETICS, CLINICAL AND DRUG ANALYSIS

A. Introduction of Cosmetics, evaluation of cosmetics materials, raw material and additives, Cosmetics colors, Perfumes in cosmetics, Cosmetics formulating, introduction, standards and methods of analysis, Creams, face powders, Make-up, Shaving preparations, Bath preparations.

B. Concepts and principles of analytic methods commonly used in the clinical species: i.e. ammonia, blood urea Nitrogen, Ca, Cl, CO_2, Fe, K, Li, Mg, Na, P, urea, glucose.

Method for analysis of proteins (i.e. albumin, bilirubin, creatinine, cholesterol, HDL-cholesterol, triglycerides, creatinine) and Enzymes (i.e. Aanine Aminotransferase, acid phosphatase, alkaline phosphatase, amylase, aspartate, aminotransferase, cholinesterase, lactate, and lipase).

BOOK SUGGESTED :

1. Environmental Chemistry, S.E. Manahan, Lewis Publishers.
2. Environmental chemistry, Sharma and Kaur, Krishna Publishers.
3. Environmental Chemistry, A.K. De, Wiley Eastern.
4. Environmental Chemistry, Analysis, S.M. Khopkar, Wiley Eastern.
5. Standard Method of Chemical Analysis, F.J. Welcher Vol. III, Van Nostrand Reinhold Co.
6. Environmental Toxicology, Ed. J. Rose, Gordon and Breach Science Publication.
7. Environmental Chemistry, C. Baird, W.H. Freeman.
8. Analytical chemistry, G.D. Christian, J. Wiley.
9. Fundamentals of Analytical Chemistry, D.A. Skoog, D.m. West and F.J. Holler, W.B. Saunders.
10. Analytical Chemistry - Principles, J.H. Kennedy, W. Saunders.
11. Analytical Chemistry-Principles, and Techniques, L.G. hargis, Prentice Hall.
12. Principles of Instrumental Analysis, D.A. Skoog and J.L. Loary, W.B. Saunders.
13. Principles of Instrumental Analysis, D.A. Skoog, W.B. Saunders.
14. Quantitative Analysis, R.A. Day, Jr. and A.L. Underwood, Prentice Hall.
15. Environmental Solution Analysis, S.M. Khopkar, Wiley Eastern.

भू–विज्ञान एवं जल संसाधन प्रबधन अध्ययनशाला
पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

क्रमांक 5055 /भू–विज्ञान.अ.शा./2021 रायपुर, दिनांक 15.02.2021

प्रति,

विशेष कर्तव्यस्थ अधिकारी (अका.)
पं. रविशंकर शुक्ल विश्वविद्यालय,
रायपुर (छ.ग.)

विषय :– पी–एच.डी. प्रवेश–परीक्षा का पाठ्यक्रम प्रेषण बाबत्।

संदर्भ :– आदेश क्रमांक– 1464/अका./शोध/2021 रायपुर, दिनांक 11.02.2021

महोदय,

विषयांतर्गत संदर्भित आदेश के अनुक्रम में भू–विज्ञान एवं जल संसाधन प्रबंधन अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर से संबंधित आपके द्वारा चाहा गया पी–एच.डी. प्रवेश परीक्षा का पाठ्यक्रम छात्रों के अवलोकनार्थ विश्वविद्यालय के वेबसाईट पर अपलोड हेतु, इस पत्र के संलग्न कर आपकी ओर प्रेषित किया जा रहा है।

संलग्न : उपरोक्तानुसार

विभागाध्यक्ष
Head
School of Studies in Geology & WP
Pt. Ravishankar Shukla University
Raipur-492010 (C.G.)

अकादमिक विभाग
1389

Ph.D. Entrance Exam Syllabus 2020-21 (Geology)

STRUCTURAL GEOLOGY

Rock deformation: Theory of stress & strain, their relationship; Factors controlling rock deformation, Properties of elastic, plastic and brittle materials; Progressive deformation, Strain analysis: types of strain; strain ellipse; strain ellipsoid; Geological application of strain theory. Rheology., Stress analysis: compressive and shear stress; biaxial and triaxial stress. Mohr's Circle and envelope, Fold: Definition, Geometrical and Genetic Classification of Fold. Fleutys Classification, Ramsay Classification and Dip Isogon Classification, Mechanism of Fold formation and types of fold, Superimposed fold; Outcrop pattern of superimposed structure comprising of two fold system, Joints, and its types; their analysis and relation with major structures, Fault: Types and mechanism of faulting, Principal stress orientation for the main fault types; Relationship between stress and strain ellipsoid, Analyses of brittle-ductile and ductile shear zones, Petrofabric Analysis: Field and laboratory techniques. Preparation of petrofabric diagrams and their interpretation, Cleavage & Schistosity: definition and types, Mechanism of formation of Cleavage & Schistosity; its relationship with major deformation structures, Lineation: definition and its types; their mode of development and relation to major structures, Plutons: Definition & description; its role in progressive deformation, Tectonites: definition and its types, Stereographic Projection: Principles and application, Tectonics and structural characteristics of Plate Boundaries; associated structures in extensional, compressional and strike-slip terrains, Geodynamic evolution of the Himalayas

MINERALOGY

Composition of minerals and Mineraloids, Physical Properties of Minerals depending on Crystal Growth, Crystal Structure, Chemical Composition and Interaction with light, Electrical Magnetic, Luminescence, Thermal and Radioactive Properties of Mineral, Structure of Silicates, Ionic Radius, Coordination Principles, Close Packing, Pauling's Rules, Unit Cell, Bonding Forces in crystals Ionic Bond, Covalent Bond, Van Der Waal's Bond, Metallic Bond, Solid solution - Substitution, Interstitial and Omission solid solution. Ex-solution, Polymorphism, polytypism, pseudomorphism, Classification of Minerals. Systematic mineralogy of Olivine Group Garnet Group Al2SiO5 Group Zircon, Topaz, Staurolite, Sphene. Epidote, Cordierite, Tourmaline Beryl,Pyroxene Group, Amphibole Group Serpentine Group, Mica Group, Chlorite Group ,Clay Mineral Group – Kaolin and Talc, SiO2 Group, Zeolite Group Feldspar Group Feldspathoid Group Carbonates and Phosphates, Gem and Semi precious minerals.

GEOCHEMISTRY

Introduction to Geochemistry. Cosmic Abundance of the Elements and Nucleosynthesis. Geochemical classification of elements. Formation of Solar System

and Planets, Composition and Classification of Meteorites, Chondrules, Chondrites and Achondrites. Geology and Chemistry of Moon, Trace, Volatile, Semi volatile, Alkali and Alkaline earth elements its behaviour in Fractional Crystallization and Partial melting, REE and Y, HFSE elements, Transition & Noble elements-its importance and concentrations in various igneous rocks and its behaviour in various magmatic processes, Partition coefficient, Factors governing partition co-efficient, Compatible and incompatible elements, behaviour of these elements in Fractional Crystallization and partial melting, Fundamental Laws of Thermodynamics. Free energy. Phase equilibrium and Gibb's Phase Rule, Thermodynamics of magmatic Crystallization, Geochemistry of island arcs, Geochemistry of Crust, Composition of Mantle, mineralogy of lower mantle, Phase transition in the Mantle, mineral-phase transition in lower mantle, Stable isotope geochemistry. Oxygen isotope studies. Isotope fractionation, application, use of oxygen isotope together with radiogenic isotope in correlation diagrams, Carbon isotope. Carbon isotope studies in association with Oxygen isotope for Carbonate rocks, Radiogenic isotopes.Decay scheme, Laws of decay, half-life period. Decay scheme of K-Ar, Sm-Nd and Rb-Sr. Radiogenic isotopes in petrogenesis, Isotopic reservoirs, Depleted mantle (DM), HIMU Mantle, Enriched Mantle, PREMA, Bulk Silicate Earth (BSE), Continental crustal source, Aquatic Chemistry- Acid Base reactions, Dissolution and Precipitation of CaCO3. Solubility of Mg, SiO2 and Al(OH)3, Geochemical properties of clays - Kaolinite, Pyrophyllite and Chlorite Groups. Ion exchange properties of clays, Redox in Natural Waters. Eutrophication. Factors controlling Weathering. Soil profile. Chemical and biogeochemical cycling in the soil, Composition of Rivers. Composition of Seawater- Temperature variation.Density structure and deep circulation, Distribution of CO2 in Ocean. Carbonate dissolution and precipitation. Sources and sinks of Dissolved matter in seawater.

CRYSTALLOGRAPHY & CRYSTAL OPTICS

Crystal growth. Development of ideas of internal structure of crystals, Space lattices and point systems. X-ray analysis of crystal structure, SEM, TEM, Morphology of crystals. Fundamental Laws of Crystal Zones and Zonal Symbols, Symmetry elements, operations. Classification of Crystals in 32 Classes, Symmetry and forms of crystals of isometric, tetragonal and hexagonal systems, Symmetry and forms of crystals of orthorhombic, monoclinic and triclinic systems, Goniometry of Crystals. Crystal Projections – Spherical, Gnomonic and Stereographic, Crystal Aggregates, Twinning, Irregularities & Imperfections in Crystals, Principles of transmission and reflection of light from crystals. Classification of minerals according to interaction of light, Interference colour, Refraction and Refractometry. Methods of determination of R.I., Birefringence in Crystals. Significance and use of plates, wedge and Bereck Compensator, Pleochroism in Crystals, Classification of Crystals into isotropic, Uniaxial and Biaxial minerals, Isotropic, uniaxial and biaxial indicatrix, Optical characters of Isotropic and uniaxial minerals, Optical characters of biaxial minerals, Optical Orientation – Extinction angle, Universal stage. Construction & Use, Dispersion in mineral optic axial angle, Optical anomalies, Systematic determination of optical properties of minerals.

IGNEOUS PETROLOGY

Factors affecting magma and its evolution. Composition of primary magma; mantle mineralogy, Partial melting of mantle – different models. Trace element behavior during partial melting, Magmatic differentiation processes, Behavior of major and trace elements during fractional crystallization, Concurrent assimilation and fractional crystallization. Magma mixing, Various criterion for classification of Igneous rocks, Petrographic Province. Different variation diagrams and their applications, Crystallization of basaltic magmas. Generation of magma with reference to plate tectonics, Study the petrogenetic significance of following silicate systems: Albite-Anorthite, Forsterite – Silica, Diopside-Albite-Anorthite, Dioside-Forsterite- Silica, Nepheline-kalsilite-silica Petrogenetic study of Basalt and Ophiolite, Peridotite and other Ultramafic rocks, Granite, Anorthosite Komatite, Kimberlite and Lamproite, Carbonatite, Lamprophyre, and their distribution in India, Mid-ocean ridge volcanism and oceanic intra-plate volcanism., Magmatism associated with subduction related igneous activity- continental and island arcs.Magmatism in Large Igneous Plutons and continental alkaline magmatism.

METAMORPHIC PETROLOGY

Definition of metamorphism, significance of metamorphic rocks, Agents and kinds of metamorphism, Phase rule and its application in metamorphism, Structure and texture of metamorphic rocks and their significance. Classification of metamorphic rocks, Fabric of metamorphic rocks, Evolution of the concept of depth zones. Systematic study of Barrovian and Abukuma zones of metamorphism, Grade of metamorphism, Isograde & reaction Isograde and construction of petrogenetic grids, Study of ACF, AKF and AFM diagrams, Concept of Facies and Facies series, Polymetamorphism and Paired metamorphic belts, Metamorphic differentiation, Retrograde Metamorphism and Crystalloblastic series, General Characters of thermal and regional metamorphism of Calcareous, Pelitic and Basic igneous rocks. Migmatites, Tectonics and Metamorphism, Metasomatism-Principles and types of metasomatism, Anataxis, Palingenesis, Kinetics of metamorphic mineral reaction. Pressure – Temperature – time paths, Ultra-high temperature metamorphism, Ultra-high pressure metamorphism, Petrogenetic significance of following rocks with special reference to Indian occurrences: Charnockite, Amphibolite, Khondalite, Gondite, Eclogite.

SEDIMENTOLOGY AND CRUSTAL EVOLUTION

Earth surface system – liberation and flux of sediments, Processes of transport and generation of sedimentary structures. Flow regimes and related bed forms, Stromatolites and their significance, Textural analysis of sediments, Graphical representation, statistical treatment and geological significance, Classification of sandstone and carbonate rocks. Dolomite and dolomitization, Volcaniclastics. Sedimentary environments and facies, Continental: alluvial-fluvial facies, Lacustrine, Desert – Aeolian and glacial sedimentary environments, Shallow coastal clastics and shallow water carbonates, Evaporites. Deep-sea basins, Paleocurrents and basin analysis, Clastic Petrofacies. Plaeoclimates and paleoenvironment analysis, Diagenesis of sandstone and carbonate rocks – changes in mineralogy, fabric, and chemistry, Petrogenesis of arkoses, greywacke and quartz arenites, Evolution of lithosphere, hydrosphere, atmosphere and biosphere, Application of Trace, REE and stable isotopes

geochemistry to sedimentalogical problems, Surface features of earth – island arcs, mid-oceanic ridges, Young mountain belts and their distribution. Evolution of continental and oceanic crust, Lithological, geochemical, stratigraphic characteristics of granite-greenstone belts, Evolution of Proterozoic sedimentary basins of India, Anatomy of Orogenic belts and formation of mountain roots, Life in Pre Cambrians, PreCambrian Cambrian boundary with special reference to India

STRATIGRAPHIC PRINCIPLES AND INDIAN GEOLOGY

Principles of stratigraphic scales and its divisions, dual classification, Stratigraphic units – lihtostratigraphic, biostratigraphic and chronostratigraphic, Rules of stratigraphic nomenclature, Stratigraphic correlation, Concept of sequence stratigraphy, Chief divisions of Indian sub continent and their physiographic characters, Archaean Era. Distribution and classification in Peninsula (Mysore, Bihar, M. P. and Rajasthan) and extrapeninsular regions. Their correlation and economic importance, Dharwar Supergroup (Classification, Distribution, Economic importance), Cuddaph Supergroup its distribution, classification & equivalent in extra peninsula, Vindhyan Supergroup – its distribution classification age economic importance and correlation, Chhattisgarh Group, Indravati Group and Khairagarh Group, their classification, age correlation and economic importance, Palaeozic formations of extra peninsular regions with special reference to their classification distribution and correlation, Distribution, geological succession, classification and climate of Gondwana `Supergroup. Age and correlation of Gondwana formations, Jurassic system of rocks – in extrapeninsular region, Distribution, Classification & correlation of cretaceous formations of Peninsula and extra peninsulas regions of India, Distribution, structural features and age of the Deccan Traps. Inter trappeans and infra trappeans of India, Problems of Permo-triaassic and Cretaceous – Palaeocene boundaries, Distribution, succession, correlation and life of Siwalik formations, Distribution, lithology, correlation & life of the Cenozoics of Assam & Western India and Pleistocence (Quaternary) deposits, Karewa Beds, Indogangetic Alluvium, Quaternary climate, glacial and interglacial cycle, Eustatic changes

PALAEONTOLOGY

Definition of fossil and modes of fossilization their application in age determination, paleoclimatology, palaeogeography and evolution, Modes and theories of organic evolution, concept of bathymetric distribution of animals, migration and extinction of species, Outline classification of organisms, Study of morphology, classification, evolutionary trends and geologic and geographic distribution of Brachiopod, Study of morphology, Classification, Evolutionary geologic history of the following Pelecypoda (Lamellibranches),Gastropoda, Cephalopoda ,Trilobites, Echinoids. Graptolites and Rugose Corals. An elementary idea about the origin of major groups of vertebrates., Study of evolutionary history of Horse and Elephant Man. General study of Siwalik mammalian fauna. Plant life through geologic ages. Study of fossil flora of Gondwana Group and Tertiary Formations of India. Definition and scope of micropaleontology. Techniques in micropaleontology. Application of microfossils in stratigraphic correlation, age determination and palaeoenvironmental interpretations. Study of morphology of foraminifers. Classification, evolution and geological distribution of foraminifers.

ORE AND FUEL GEOLOGY

Modern concepts of ore genesis. Spatial and temporal distribution of ore deposits-Global perspective, Concept of ore bearing fluids, their origin and migration. Fluid inclusion in ores – limitations and applications, Texture, papargensis and zoning in ores, Wall rock alteration. Structural, physico-chemical and stratigraphic controls of ore localization, Orthomagmatic ores of mafic-ultramafic association _ Diamonds in Kimberlites, REE in Carbonatite, Ti -V Ores, Chromite and PGE, Ni Ores, Cyprus type Cu-Zn Ores, Ores of Silicic igneous rocks- Kiruna type Fe-P. Pegmatoids, Greisen and Skarn deposits, Porphyry associations – Kuroko type Zn-Pb-Cu, Malanjkhand Type Cu-Mo deposits, Ores of Sedimentary affiliations- Chemical and Clastic sediments. Stratiform and Stratabound ore deposits. (Fe, Mn, non ferrous). Placers and paleoplacers, Ores of Metamorphic affiliations. Metamorphism of ores and metamorphogenic ores, Ores related to weathered surfaces – Bauxite, Ni and Au laterite, Mineralogy, genesis, distribution in India and uses of Cu, Pb, Zn, Ion and manganese, Gold and Silver, Aluminum and chromium, National Mineral Policy and mineral concession rules, Definition and origin of Kerogene and coal. Rank, Grade and type of coal. Microscopic constituents of coal, Chemical characterization of coal Proximate and Ultimate analysis. Coal bed methane, Distribution of Coal in India. Origin, nature and migration of oil and gas. Characteristics of reservoir rocks, Oil bearing basins of India. Geology of productive oil fields of India. Mode of Occurrence and association of atomic minerals in nature. Productive geological horizons.

GEMORPHOLOGY AND REMOTE SENSING

Geomorphic concepts and geomorphic cycle, Geomorphic processes – Weathering, soil formation, Mass-Wasting, Valley development, cycle of erosion, rejuvenation, Drainage patterns and their significance, Fluvial landforms and Glacial landforms, Karst topography, Arid and Eolian landforms, Coastal and volcanic landforms, Terrain evaluation and concept of morphometric analysis, Geomorphological mapping based on genesis of landforms, Geomorphic regions of India. Principles of terrain analysis, Concept and physical basis of remote sensing. Platforms: Terrestrial, Aerial and Space platforms. Advantages and limitations, Electromagnetic spectrum and principles of remote sensing, Interaction of EMR with atmosphere and earth surface features, Remote sensing sensors, data acquisition, visual interpretation and digital processing techniques. Interpretation of topographic and tectonic features, Aerial photography, photographs and their geometry. Photogrammetry, Satellite remote sensing. Global and Indian space missions. Satellite exploration Programs and their characteristics, Application of remote sensing in geology, Application in Geomorphology, Application in groundwater evaluation, terrain evaluation and strategic purposes.

MINERAL EXPLORATION

Prospecting & Exploration: Definition and characteristic features. Stages of prospecting, regional and detailed exploration; objectives and practices of these stages, Guides to ore search: global, regional and local guides, Detailed study of Regional, Physiographic, Stratigraphic, Lithological, Mineralogical and Structural guides, Drilling: Type of drills,

Diamond drilling, Drilling records and logs, Duty of geologists during drilling, Sampling: General principles, various methods and procedures. Salting. Precautions during Sampling, Calculating grade and tonnage of ore: Average grade, volume, specific gravity, tonnage factor, UNFC classification, Gravity Method of prospecting: Principle and Instrumentation. Gravity field surveys. Gravity corrections: Free-air correction, Bouguer correction, Latitude correction, Terrain correction. Magnetic method of prospecting: Magnetic properties. Magnetic anomaly. Magnetometer. Field survey. Preparation of magnetic anomaly maps. Aeromagnetic surveys, Seismic prospecting: Fundamentals of seismic wave propagation. Methods of seismic prospecting: Refraction and reflection seismic methods. Seismic Stratigraphy, Detection of hydrocarbons, Electrical methods of prospecting: Basic principles of resistivity method. Electrical properties of rocks, Flow of current through ground surface, Apparent resistivity, Electrode arrangements, Resistivity survey. Application and interpretation of resistivity data, Electromagnetic methods of prospecting: Electromagnetic spectrum and induction, EM frequency and depth of penetration, EM response of conductors, Classification of EM methods and their description: Telluric current method, Magnetotelluric method, CSMT/CSAMT, Tilt angle method, Turam method, VLF method, Transient EM methods, Ground Penetrating Radar, Radiometric prospecting and Borehole Logging. Radiometric survey, Application and interpretation of data, Borehole logging: Different geophysical logs, Equipment; measurements and interpretation, Geochemical mobility and association of elements. Forms of primary and surficial dispersion patterns., Secondary dispersion processes and anomalies.Factors affecting dispersion patterns, Geochemical surveys: Litho-geochemical and Pedo-geochemical surveys, Geochemical surveys: Hydro-geochemical, Atmo-geochemical and Bio-geochemical surveys, Case studies of regional exploration for deposits of plutonic associations; vein and replacement types; magmatic sulphides and chromite; pegmatitic depsoits of Sn and rare metals, Case studies of regional exploration for deposits of hydrothermal deposits of Au-Ag, base metals, W-Mo, U; skarn deposits; sedimentary and supergene deposits, Instrumental analytical techniques, Statistical analysis and interpretation of geochemical prospecting data.

MINING GEOLOGY, ENGINEERING GEOLOGY AND MINERAL DRESSING

Definition of mining terms: pitting, trenching, adits, tunnels, and shafts, Role of geologist in mining industry, Geological structures of ore deposits and choice of mining methods, Mine Subsidence and mine support. Rock bursts, Mine Ventilation. Mine Drainage, Geological and geomorphic control on mining methods. Alluvial mining, Open pit mining. Methods of opencast mining; its advantages and limitations, Underground mining methods – drifting; cross cutting; winzing; stoping; room and pillaring; top –slicing; sub-level caving and block caving, Coal mining methods: Long wall, Board and Pillar method, Engineering properties of rocks and soil. Physical characters of building stones. Aggregate, Geological considerations for evaluation of Dam and reservoir sites. Dam foundation problems. Dam failure, Geotechnical evaluation of tunnel alignment and transportation routes. Methods of tunneling, Role of geologist in engineering projects, General principles and scope of Mineral Dressing, Primary and secondary breaking, crushing and grinding, liberation by sizes, reduction, Principles and methods of screening, Principles and methods of classification, classification as a means of concentration, Concentration methods, hand sorting, washing, jigging, tabling heavy fluid, Magnetic and electrostatic methods of separation of minerals, Floatation methods-

Principles and techniques with examples, Application of ore microscopy in mineral dressing.

ENVRIONMENTAL GEOLOGY

Definition, Scope and Basic concepts of Environmental Geology, Environment, Ecology, Ecosystems and habitat, Renewable and non-renewable natural resources, Role of geology in natural resources management and environmental planning, Landforms as ecosystem units, Characteristics of various environmental regimes – fluvial, coastal, marine, Aeolian, desert, and glacial, Understanding their causes, types, Mitigation and Management. Geomorphic controls on biodiversity and its conservation, Conservation of soil and water resources, Geological hazards: Lands slides, Volcanic activity, Earthquake and Tsunami, Understanding their causes, types, Mitigation and Management, Draught and desertification, Measures of mitigation, Sea level changes. Measures of mitigation, Geological hazards -River flooding, erosion and sedimentation, coastal erosion, cyclones and tsunamis, Human modifications of nature on surface and subsurface by engineering, Human modifications of nature on surface and subsurface by mining activities, Human settlement and contamination of atmosphere, soil, surface water and groundwater by waste disposal and agro-industries, National Environmental Policy for air and water pollution, National Environmental Laws, Climate Change and global warming: Causes and Impact (Ozone layer depletion and ozone hole), Environment impact assessment report and preparation of environment Management plans.

HYDROGEOLOGY

Scope of hydrogeology and its relation with hydrology, meteorology and their uses in the Hydrogeological investigation, Hydrologic cycle. Role of groundwater in the hydrologic cycle, Hydrograph, data collection and analysis, Water table and piezometric surface. Water table fluctuation. Water table contour maps, interpretation and uses, Water bearing formation - aquifers, aquitard. aquiclude, aquifuse. Aquifer types: perched, unconfined, semi-confined and confined. Isotropic, anisotropic aquifers, Porosity, permeability. Ground water movement: Darcy's law and its applications, Specific yield and specific retention. Storativity and transmissivity, Steady and unsteady flow, leaky aquifers. Groundwater flow near aquifer boundaries, Bounded aquifers. Image wells, Water wells and their types. Construction of wells, Well Development and completion, Pumping test and Yield of wells, Geological and Hydrogeological methods of groundwater exploration, Geophysical methods – Electrical resistivity method for groundwater exploration, Application of remote sensing in groundwater exploration, Basin wise development of groundwater with special reference to Chhattisgarh region, Groundwater provinces of India, Sources of dissolved constituents in groundwater. Groundwater quality standards-drinking, domestic, agriculture and industry. Groundwater pollution, Groundwater management. Safe yield, overdraft and spacing of wells, Conservation of Groundwater; conjunctive use of water. Artificial recharge.

Ph. D. Entrance Examination 2010

Subject – PSYCHOLOGY

SYLLABUS

1. FUNDATIONS AND METHODS OF PSYCHOLOGY:

Psychology in relation to other social scienceS , Application of Psychology to societal problems, Scientific Methods,Type of research, Methods of Research

2. RESEARCH METHODS:

Major steps in Psychology Research, Fundamental versus applied research, methods of data collection, research designs , application of statistical techniques.

3. DEVELOPMENT OF HUMAN BEHAVIOUR:

Growth and development , Role of nature and nurture, life span development , promoting psychological well-being across stages of the life span development.

4. PSYCHOLOGICAL PROCESSES:

Perception, biological and psychological factors, learning concepts and theories, thinking and problem solving, motivation, personality, attitudes, values and interests.

5. ISSUES AND PERSPECTIVES IN MODERN CONTEMPORARY PSYCHOLOGY:

Computer application in the psychological laboratory and psychological testing, psychocybernetics , simulation studies.

17/2/21

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पाठ्यक्रम

पी–एच.डी. प्रवेश–परीक्षा 2020–21 - इतिहास

(अ)

1. इतिहास का अर्थ, परिभाषा एवं स्वरुप
2. इतिहास का अन्य सामाजिक विज्ञानों से संबंध
3. इतिहास में वस्तुनिष्ठता
4. भारतीय इतिहास की मार्क्सवादी व्याख्या, साम्राज्यवादी व्याख्या,
5. भारतीय इतिहास की राष्ट्रवादी व्याख्या, जनवादी व्याख्या
6. शोध का उद्देश्य एवं महत्व, शोध प्रारुप
7. परिकल्पना, साहित्यावलोकन, संदर्भग्रंथ सूची–प्राथमिक एवं द्वितीयक स्त्रोत
8. इतिहास शोध की पद्धति– अभिलेखागरीय, ऐतिहासिक अवलोकन, समाजशास्त्रीय पद्धति
9. भारतीय इतिहास जानने के स्त्रोत– साहित्यिक, पुरातात्विक,विदेशी यात्रा वृतांत
10. भारतीय इतिहास जानने के स्त्रोत– अभिलेखागारीय, शासकीय प्रतिवेदन एवं अशासकीय स्त्रोत

(ब)

1. प्रागैतिहासिक काल एवं सिन्धु घाटी की सभ्यता
2. वैदिक कालीन सभ्यता और संस्कृति
3. छठी शताब्दी ई.पू. में भारत की राजनीतिक स्थिति
4. जैन धर्म एवं बौद्ध धर्म
5. मौर्यकाल
6. हिन्द--यूनानी, शक एवं कुषाण
7. गुप्तकाल–
8. वर्धन साम्राज्य
9. दक्षिण भारत के प्रमुख राजवंश
10. राजपूत युग
11. वृहत्तर भारत एवं विदेशों से संबंध

(स)

1. भारत में ईस्लाम का प्रसार और अरबों तथा तुर्कों के आक्रमण
2. दिल्ली सल्तनत – गुलाम वंश, खिलजी वंश, तुगलक वंश, सैयद एवं लोदी वंश
3. सल्तनत कालीन – प्रशासन, सामाजिक , आर्थिक एवं धार्मिक दशा, कला एवं संस्कृति
4. विजय नगर एवं बहमनी राज्य
5. मुगल काल – बाबर, हुमायूँ, शेरशाह, अकबर, जहांगीर, शाहजहां तथा औरंगजेब
6. मुगलकालीन – प्रशासन, सामाजिक, आर्थिक, धार्मिक दशा, कला एवं संस्कृति

7. मराठों का उत्थान – शिवाजी की विजयें तथा प्रशासन एवं पेशवाओं के अधीन मराठा
8. सूफ़ीमत, भक्ति आंदोलन तथा सिक्ख धर्म

(द)

1. भारत में यूरोपीय व्यापारिक कंपनियों का आगमन
2. बंगाल में अंग्रेजी राज्य की स्थापना – प्लासी एवं बक्सर का युद्ध, घटनाएँ एवं परिणाम
3. ईस्ट इंडिया कंपनी के अधीन केंद्रीय तथा प्रांतीय ढांचे का विकास (1773 ई.–1857ई.)
4. भारत में ब्रिटिश आर्थिक, सामाजिक एवं सांस्कृतिक नीतियाँ (1757ई.–1857ई.)
5. 1857 की क्रांति – स्वरुप, कारण, घटनाएँ, परिणाम एवं महत्व
6. 1858 के पश्चात् प्रशासनिक परिवर्तन, संवैधानिक विकास एवं भारत पर प्रभाव
7. 19 वीं शताब्दी के पूर्वार्द्ध में सामाजिक एवं धार्मिक सुधार
8. भारत में राष्ट्रीय जागरण का उदय एवं विकास – कांग्रेस की स्थापना, उदारवाद एवं उग्रवाद
9. गांधी युग का राष्ट्रीय आंदोलन (1920ई.–1947ई.)
10. राष्ट्रीय आंदोलन में अन्य धाराएँ– क्रांतिकारी आंदोलन, वामपंथी आंदोलन, आजाद हिन्द फौज,
11. साम्प्रदायिकता का उदय और विकास एवं भारत विभाजन
12. 1858 से 1947ई. तक ब्रिटिश युगीन भारत की सामाजिक, आर्थिक एवं सांस्कृतिक स्थिति
13. भारत स्वतंत्रता से 1964 ई. तक– 1947 ई. का भारतीय स्वाधीनता का कानून, भारतीय संविधान का निर्माण, नेहरु का विकासवादी समाजवादी दर्शन, योजना व्यवस्था, कृषि सुधार, औधोगीकरण, गुटनिरपेक्षता एवं पड़ोसी देशो से संबंध

(ई)

1. पुनर्जागरण एवं धर्म सुधार आंदोलन
2. औद्योगिक क्रांति– कारण, विस्तार, परिणाम एवं प्रभाव
3. अमेरिका का स्वतंत्रता संग्राम–कारण ,घटनाएं एवं परिणाम
4. 1789 ई. का फ्रांस की क्रांति–कारण ,घटनाएं एवं परिणाम
5. इंग्लैण्ड में उदारवाद का विकास
6. इटली एवं जर्मनी का एकीकरण
7. जापान में मेईजी पुर्नस्थापना एवं आधुनिकीकरण
8. प्रथम विश्व युद्ध– कारण ,घटनाएं एवं परिणाम
9. राष्टसंघ –उददेश्य ,संगठन, उपलब्धियां तथा असफलताएं
10. 1917 की रूसी क्रांति– कारण ,घटनाएं, परिणाम एवं महत्व
11. इटली में फांसीवाद और मुसोलिनी
12. जर्मनी में नाजीवाद और हिटलर
13. द्वितीय विश्व युद्ध– कारण ,घटनाएं, परिणाम एवं महत्व
14. संयुक्त राष्टसंघ– उददेश्य ,संगठन, एवं उपलब्धियां
15. शीत युद्ध–कारण ,प्रसार,घटनाएं एवं परिणाम
16. चीन में साम्यवाद
17. अरब राष्टीयता
18. तुर्की का उदय
19. गुटनिरपेक्ष आंदोलन

(फ)

1. छत्तीसगढ़ का भौगोलिक परिचय–सीमाएं, नामकरण
2. प्राचीन कालीन छत्तीसगढ – प्रागैतिहासिक काल से पूर्व मौर्यकाल तक
3. प्राचीन कालीन छत्तीसगढ – मौर्य, गुप्त, वाकाटक, नल, राजर्षितुल्य ,शरभपुरीय, पांडु , छिन्दकनाग, सोमवंश
4. छत्तीसगढ़ में कल्चुरी एवं कल्चुरी युगीन सामाजिक, आर्थिक एवं सांस्कृतिक दशा
5. छत्तीसगढ़ में मराठा शासन एवं मराठा युगीन सामाजिक, आर्थिक एवं सांस्कृतिक दशा
6. छत्तीसगढ़ में ब्रिटिश शासन एवं ब्रिटिश युगीन सामाजिक, आर्थिक एवं सांस्कृतिक दशा
7. छत्तीसगढ़ की जमींदारियां एवं करद राज्य तथा भारतीय संघ में विलय
8. 1857 ई. का विद्रोह एवं छत्तीसगढ़
9. छत्तीसगढ़ में स्वाधीनता आंदोलन 1947 ई. तक
10. छत्तीसगढ़ में किसान ,मजदूर एवं जनजातीय आंदोलन
11. छत्तीसगढ़ में कबीर पंथ एवं सतनाम पंथ
12. छत्तीसगढ़ की लोक कला, साहित्य एवं संस्कृति
13. छत्तीसगढ़ राज्य निर्माण की पृष्ठभूमि
14. छत्तीसगढ़ के प्रमुख ऐतिहासिक स्थल एवं महान विभूतियां