

<p><b>Paper 1</b> <b>Inorganic Chemistry</b></p>	<p>CO1 : Classify acids and bases as hard and soft. Determine acid-base strength and emphasize theoretical basis of hardness and softness of acid, base.</p> <p>CO2: Describe Metal-ligand bonding in transition metal complexes. Illustrate crystal-field splitting in octahedral, tetrahedral, square planar complexes, and factors affecting the crystal-field parameters. Differentiate magnetic behavior of transition metal complexes. determine magnetic moment data for 3d metal complexes.</p> <p>CO3: Identify electronic spectra of transition metal complexes, distinguish various types of electronic transitions, predict spectroscopic ground states, Draw electronic spectrum of <math>[\text{Ti}(\text{H}_2\text{O})_6]^{3+}</math> complex, determine thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.</p> <p>CO4: classify organometallic compounds. Illustrate properties and bonding in organometallic compounds. applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, nature of bonding in metal carbonyls.</p> <p>CO5: Identify essential and trace elements to biological processes. Describe structure and properties of metalloporphyrins like haemoglobin and myoglobin. Emphasize biological role of alkali and alkaline earth metal ions. inorganic polymers: Silicones and phosphazenes.</p>
<p><b>Paper 2: Organic Chemistry</b></p>	<p>CO1: Describe basic concepts of <math>^1\text{H}</math>-NMR spectroscopy, illustrate nuclear shielding, deshielding, chemical shift and spin-spin splitting. determine coupling constants, Interpret NMR spectra of simple organic molecules, solve problems pertaining to the structure elucidation of simple organic compounds using spectroscopic data. Interpret acidity of alpha hydrogens in</p>

reactive methylene compounds, exhibit alkylation of diethyl malonate and ethyl acetoacetate. Synthetically apply ethyl acetoacetate and malonic ester.

CO2: Draw molecular orbital diagram and determine aromatic characteristics of pyrrole, furan, thiophene and pyridine. Illustrate mechanism of nucleophilic substitution reactions in pyridine derivatives. Compare basicity of pyridine, piperidine and pyrrole. Describe preparation and reactions of indole, quinoline and isoquinoline. Illustrate mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

CO3: Classify and name monosaccharides, Determine mechanism of osazone formation, Differentiate epimers and anomers. Interconvert glucose and fructose, exhibit chain lengthening and chain shortening of aldoses Differentiate erythro and threo diastereomers.

CO 4: Classify amino acids. Determine acid-base behaviour of amino acids, Illustrate isoelectric point and electrophoresis. Classify proteins, determine peptide structure, analyze end-group in proteins. Analyze constituents of nucleic acids, nucleosides and nucleotides.

CO 5: Illustrate structural features, methods of formation and chemical reactions of thiols, sulphonic acids, sulphonamides and Sulpha drugs. Identify synthetic polymers. Determine mechanism of Addition or chain-growth polymerization, free radical and ionic polymerization, Condensation or step-growth polymerization. Illustrate applications of Polyesters, polyamides phenol-formaldehyde resins, Classify dyes. Chemistry and synthesis of methyl orange, congo red, malachite green, crystal violet, phenolphthalein, alizarin and indigo.

**Paper 3: Physical Chemistry**

CO1: Illustrate black-body radiation, Planck's radiation law, Compton effect and photoelectric effect, Calculate heat capacity of solids, illustrate Bohr's model of hydrogen atom and its defects. Generalize De Broglie hypothesis, and Heisenberg's uncertainty principle, enumerate Sinusoidal wave equation. Derive Schrodinger wave equation. physical interpretation of the wave function, exhibit postulates of quantum mechanics, particle in a one dimensional box. Enumerate Schrodinger wave equation for H-atom and separate into three equations

CO2: Interpret criteria for forming M.O. from A.O. construct M.O's by LCAO-H2 ion. calculate energy level from wave functions, calculate coefficients of A.O.'s used in sp, sp<sup>2</sup>, sp<sup>3</sup> hybrid orbitals. Exhibit valence bond model of H<sub>2</sub>, compare M.O. and V.B. models

CO3: Analyse Electromagnetic radiation and spectrum, illustrate basic features of different spectrometers, state the Born-Openheimer approximation, calculate and differentiate degrees of freedom. Predict Rotational Spectrum of diatomic molecules, calculate spectral intensity. determine bond length, qualitatively describe non-rigid rotator, selection rules for pure vibrational spectrum, determine force constant and establish qualitative relation of force constant and bond energies, vibrational frequencies of different functional groups. Describe polarizability. predict pure rotational and pure vibrational Raman Spectra of diatomic molecules, Draw Potential Energy curves for bonding and antibonding molecular orbitals in electronic spectrum. qualitatively describe selection rules and Frank Condon principle.

CO4 : Differentiate between thermal and photochemical processes. illustrate Grothuss-Drappcr law, Stark -Einstein law. draw Jablonski diagram depicting various processes occurring in the excited state. qualitatively describe fluorescence, phosphorescence. Interpret optical activity and polymerization. measure dipole moment by temperature method and refractivity method. Differentiate paramagnetism, diamagnetism and ferromagnetic.

CO5: Illustrate the concept of Ideal and non-ideal solutions, express concentrations of solutions, Derive Raoult's law, determine relative lowering of vapor pressure, determine molecular weight from osmotic pressure. Calculate Elevation of boiling point, depression in freezing point. Calculate degree of dissociation and association of molecules.

(Annual Scheme)

### B.Com Part III

#### Course Outcomes of Business Administration

*On studying this course the student will be able to have a clear understanding of:*

<b>Paper I Functional Management</b>	<i>CO1: Human Resource Management CO2: Job Analysis, Job Enlargement and Job Enrichment CO3: Marketing-Meaning, Evolution, Modern Importance, CO4: Concept, scope and Development , Marketing Pricing Policies and Finance Functions CO5: Meaning , Nature, Scope and Importance of Production Management</i>
<b>Paper II Advertising and Sales Management</b>	CO1: Advertising concepts CO2: Advertising Message CO3: Budget, Advertising campaign Planning CO4: Role of selling in a Planned Economy CO5: Qualities of Customer salesman; Planned Selling Approach, Role and Functions of Human Resource Management, organisation of Human Resources Department, Human Resource Planning

### B.Com Part III

#### Course Outcomes of Accountancy and Business Statistics

On studying this course the student will be able to have a clear understanding of:

<b>Paper I Auditing and Management Accounting</b>	CO1: Auditing: Meaning, Objects, Fraud and Errors, Relationship in between Book-Keeping ,Accounting and Auditing CO2: Vouching, Verification and Valuation of Assets and Liabilities CO3: Company Auditor: Audit and Auditors CO4: Management Accounting CO5: Financial Statement Analysis
<b>Paper II Management Accounting:</b>	CO1: Management Accounting CO2: Investment Accounts, Royalty Accounts CO3: Valuation of Goodwill, Valuation of Shares CO4: Internal Reconstruction and Amalgamation of Companies CO5: Liquidation of Companies

### B.Com Part III

#### Course Outcomes of EAFM

On studying this course the student will be able to have a clear understanding of:

<b>Paper I Rural Development and Cooperation</b>	CO1: Rural Development Administration CO2: Panchayati Raj Act and Rajasthan Panchayati Raj Act CO3: Rural Development Programs CO4: Programs related to Tribal Welfare CO5: Concept of Cooperation
<b>Paper II Business Budgeting</b>	CO1: Business Budgets and Budgeting CO2: Business Forecasting CO3: Cash Budgeting CO4: Product and Production Decision CO5: Project Planning and Feasibility Study

#### Course Outcomes: M.A. (F) Economics (Annual Scheme)

Paper 1 PUBLIC FINANCE	CO1: Nature and Scope of Public Finance, Role of government in the economic active Allocation, Distribution and Stabilization functions. Private, Public and Optimal Budgeting, Principle of Maximum Social Advantage, Public Expenditure, Wagner's Law, Theory of Social Goods, Effects of Public Expenditure on Production and Distribution. Public Revenue CO2: Shifting and Incidence of taxes under Monopoly and perfect
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		competition, Effects of commodity taxation on production, Effects of direct taxation on Production Progressiveness of a tax system and its measurement, Theory of Public Debt, Fiscal Policy, Main trend in the revenue of the Central and St Gevement in India
Paper 2 INTERNATIONAL ECONOMICS		<p>CO1: The Law of Comparative Advantage, Classical Theory of Comparative Advantage, Views of Adam smith, Mill. Haberler and Ricardo, The standard theory of trade, General Equilibrium of trade, Factor Endowments and Heckscher-Chin Theory Factor Price Equalization, Stolper Samuelom theorem, Ryberynski Theorem, Empirical Tests of Ricando and Heckscher Ohlin Theories Complementary de theories Economic Growth and International Trade: Growth of factors of production, Technical progress</p> <p>CO2: Free Trade versiu Protection Tarift (Partiel equilibrium effects, Oprimum Tari), Ocher Trade Reunctions (Queca, Quata versa ariff, Noo-tariff harriers and the new protectionism). The Political Economy of Pretectionism and Strategic Trade Policy. Economie- Integratico-Theory of Cum Union, Regional Trading Block Trade and Beonemle Developmens Terms of Trade, Export Imstability and economic development, Import Sebution verme Export Promotion, Currade problems of developing entries, Role of the World P/WTO, International Resource Movement and Maltitional Corporations Labour and Capital Movements end their effects, Brain Drain and role of MNC</p> <p>CO3: Foreign Exchange Market: Functions, Foreign Exchange risks, Hedging Speculation Arbitragn, future and Options, Exchange Rate and Exchange determination theories Spor and Forward Ping Power Parity Theory, Monetary approach and Portfolio approaches of exchange rate determination, Euro Currency Market Balance of payment Accounting, Causes of dinequilibrium and remedies, Deviliation and Marshall-Lemer condition, Elasticity and Abeneption approaches Fixed and Flexible Exchange Rates Case for and against fleed/flexible m rates, Adjustment under gold standard, Price specie flow Mechanics</p>
Paper 3 DEVELOPMENT ECONOMICS		<p>CO1: Meaning and Memummarts of economic development and human development structural fees and process of change empirical studies of Kumes, Denison &amp; Chenery; Ingredients of development- Land, Physical capital, Labour and Human Capital, Technological Change Scale, Organization, Growth Models- Ricardo, Marx (Classical), Harrod - Domar, Solow (Neo- Classical), Lewis Model and the Renis - Fei Extension.</p> <p>CO2: Development Planning: Balanced and Unbalanced strategies, Choice of techniques, Capital Output ratio, Investment criteria; NPV, IRR, Social Cost Benefit Analysis Accounting Prices, Applications of Input-Output Analysis in Planning, Pr Programming approach of Planning.</p> <p>CO3: Financing of economic development; Domestic and external resources, International trade and development Two-gap models, Plan Models of India. Past Performance and current issues of Indian Planning.</p>
Paper 4 Advanced Economy	Indian	CO1: Natural Resource in India- land, Water, Forest and Minerals, Compositition, Quality and Growth Trends. Characteristics of I through Recent Census, Population Policy and Economic Effec

	<p>Pressure, Poverty, Unemployment and Human Development dur Appraisal of Government Measures, India's Human Development Perspective, Agricultural Development in India: Instine Aspects- land Revolution, Technological Aspects- Agricultural input and Shin Function, Agricultural Cost and Price Policy, Agricultural Marketing Policy and Security, Subsidy and Public Distribution System, Cap Indian Agriculture, Problems in Agriculture- A Need for Second Gre</p> <p>CO2: Industry - Strategy of Industrial Development and Industrial Polic Scale and Cottage Industries, Reservation Poiley Relating to Smal Sources of Industrial Finance - Banks, Share Market, Insurance C funds, Non-Banking Sources and FDI, Role of Foreign Capital for and Portfolio Investment, Public Sector Reforms, Privatization and I Foreign Trade: Salient Features, Trends, Composition, Direction Trade Reforms, liberalization and Recent Changes in Trade Policy Impact on Indian Economy, WTO - Issues and its Impact on Indian Balance of Payment Position in Recent Years.</p> <p>CO3: Economic planning: Goals, Achievements and Shortcomings of Pla Planning and the market. Subsidy Policy and Problems, Nation Income - Growth pattern and trends, Aggregate and Sectoral Comp there in, Regional Distribution, Income Inequalities in India, New Economic Policy - LPG and Second Phase of Economic Refe Development in India - Physical Infrastructure (Power. Transpor and Imigation) and Social Infrastructure (health and education), SE as Part of Financial Inclusion, New Trends: Mudra Banking, Cashless Society</p>
<p>Paper 5 INTERNATIONAL FINANCE</p>	<p>CO1: Finance Function- Sources and Uses; International capital movements - classification and role in developing nations. Foreign Direct Investment, foreign Portfolio investment and financial instability. International Financial System and Globalization- development in Exchange, Eurocurrency Markets, Asian Dollar Markets and International Markets Principles of International Financial Management.</p> <p>CO2: Foreign Exchange Market- Structure, Kinds, instruments of payments, exchange trading, exchange risk, arbitrage and speculation. Foreign exchange rate- meaning, determination of equilibrium exchange rate, th of exchange rate and exchange rate systems. Balance of payments- meaning, components, disequilibrium of BOPs, its cause, Remedial measures. Open Economy Macro Economics- BOPS equilibrium and adjustment mechanism (automatic and policy). Trends in India's Balance of payments and growth of foreign exchange since the beginning of the 1990s</p> <p>CO3: Global Business Finance; Long term borrowing from World Bank, Development Bank and its overall impact on Indian economy Internat. Monetary System and alternative international monetary standards. IMF and prom of international liquidity. Optimum currency areas. Theory of international reserves. WTO and its impact on different sectors of the economy. Regional Multilateralism and World Trading System.</p>
<p>Paper 6 LABOUR AND INDUSTRIAL RELATIONS</p>	<p>CO!: Labour Economic - Importance, Old and new theories, Theoretical and institutional labour Economics; Theory of individual labour supply and demand for labour; Wage determination Functions and Characteristics of labour market with special reference to developing economies. Non competing groups and segmentation in</p>

	<p>labour markets, Rural labour market and rural- urban migration; TodaroHarris hypothesis; Investment in rural capital. Defination of working force and labour force; Concept of Unemployment and Under employment; Types of unemployment, Estimates of unemployment in India and Rajasthan. Employment in organized and industrial sectors in India-its size, growth and characteristics.</p> <p>CO2: Government and labour market, Labour legislation and social security, State reputation of wages; Minimum wages for industrial and Agricultural workers, Wage and income policy. Labour Unions - their role and functions; Labour unions and collective bargaining economic impact of unions. Trade Union movements in USA, Russia da India, Industrial relations- factors determining industrial relations; Collective bargaining in India.</p> <p>CO3: Industrial disputes and grievances, causes of unrest, Machinery for industrial peace; Conciliation, mediation and arbitration, Industrial disputes in India since 1980, Critical study of existing machinery of industrial relations in India. Workers participation in ownership and management-concepts and Indian experience, Industrial Labour Organization- functions and role, India and ILD. Industrial Labour and Industrial Relations in Rajasthan.</p>
<p>Paper 7 ENVIRONMENTAL ECONOMICS</p>	<p>CO1: Concept of Sustainable Development. The Environmental Costs of Development; Economic Growth and Environment; Environmental Kuznets Curve (EKC); The Nature of Environmental Goods; Market Failure and Public Policy; Theory of Extemalities and Public Goods. Renewable Resources: Optional Management of Resources, Non Renewable Resources Hotelling's rule. Resource Scarcity and Economic Growth, Population Growth, Technological Changes and Implications for Long Term Growth</p> <p>CO2: Environmental Values: Values, Non-Use Values and Option Values. Environmental Valuation: Contingent Valuation Method, Travel Cost Method, Hedonic Pricing Method Valuing Environment as input in Production: Production Function, Cost Function. Conventional National Income Accounts and Environment: Concept of Green GDP.</p> <p>CO3: Environmental Policy Instruments, Property Rights and Transaction Costs, Quantitative Regulations, Price Instruments to Correct Externalities, Pollution Taxes and Abatement Subsidies, Transferable Permits/Pollution Markets, Innovative Approaches to Control Environment Pollution.</p>

**M.Sc. Chemistry**  
**Final year (Annual Scheme)**

After completion of this course, the student will have an understanding of the following:

Course	Outcomes
<b>Paper-1:</b> <b>Applications of Spectroscopy, Photochemistry and Solid state Chemistry</b>	CO1: Ultraviolet and Visible Spectroscopy CO2: Mossbauer Spectroscopy CO3: NMR Spectroscopy CO4: Photochemical Reactions
<b>Paper-2:</b> <b>Bioinorganic Chemistry, Bioorganic Chemistry and Biophysical Chemistry</b>	CO1: Metal Ions in Biological Systems CO2: Bioorganic Chemistry CO3: Co-enzyme Chemistry CO4: Bioenergetics CO5: Thermodynamics of Biopolymer Solutions
<b>Paper-3:</b> <b>Environmental Chemistry</b>	CO1: Atmosphere CO2: Air Pollution CO3: Aquatic Chemistry and Water Pollution CO4: Environmental Toxicology
<b>Paper 4:</b> <b>Organic Synthesis-I</b>	CO1: Organometallic Reagents CO2: Oxidation Introduction CO3: Reduction Introduction CO4: Rearrangements CO5: Metallocenes , Nonbenzenoid Aromatics and
<b>Paper 5:</b> <b>Organic Synthesis-II</b>	CO1: Disconnection Approach CO2: Protecting Groups CO3: Two Group C-C Disconnections CO4: Two Group C-C Disconnections Use of 1,2-; 1,4- and 1,6-difunctionalised compounds in ring synthesis. CO5: Ring Synthesis



<p><b>Paper 6:</b></p> <p><b>Heterocyclic Chemistry</b></p>	<p>CO1: Nomenclature of Heterocycles</p> <p>CO2: Non-aromatic Heterocycles</p> <p>CO3: Small Ring Heterocycles</p> <p>CO4: Meso-ionic Heterocycles</p> <p>CO5: Six Membered Heterocycles with Two or More Heteroatoms</p>
<p><b>Paper 7:</b></p> <p><b>Course Outcome of M.Sc.(F) Annual Scheme: -</b></p> <p>After completion of the course, the students will have an understanding of-</p>	<p>CO1: Terpenoids and Carotenoids</p> <p>CO2: Alkaloids</p> <p>CO3: Steroids</p> <p>CO4: Plant Pigments</p> <p>CO5: Prostaglandins</p>

**B.Sc. Pt III**  
**Mathematics**

After completion of this course, the student will have an understanding of the following:

Course	Outcomes
<b>Paper-1: Algebra</b>	<p>CO1: Definition and simple properties of Groups Subgroups. Permutation group, Cyclic group, Cosets, Lagrange's theorem on the order of subgroups of a finite order group</p> <p>CO2: Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism</p> <p>CO3: : Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring, Integral domain and field. Characteristics of a Ring and Field.</p> <p>CO4: Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.</p> <p>CO5: Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension. Generation of subspaces. Sum of subspaces. Direct sum and Complement of</p>
<b>Paper-2: Complex Analysis</b>	<p>CO1: Complex plane. Connected and Compact sets Curves and Regions in complex plane. Jordan curve Theorem (statement only). Extended complex plane. Stereograph projection. Complex valued function - Limits, Continuity and Differentiability. Analytic functions, Cauchy-Riemann equations (Cartesian and polar form). Harmonic function Construction of an analytic function</p> <p>CO2: Complex integration Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula, Liouville's theorem.</p> <p>CO3: Taylor's theorem. Laurent's theorem Maximum modulus theorem. Power series Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.</p> <p>CO4: Singularities of an analytic function, Branch point Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem. Residue at a singularity, Cauchy's residue theorem Argument principle Rouché's theorem Fundamental</p>

**Paper-3: Mechanics**

CO1: Velocity and acceleration - along radial and transverse directions along tangent and normal directions. S.H.M., Hooke's law, motion along horizontal and vertical strings.

CO2: Motion in resisting medium Resistance varies as velocity and square of work Work and Energy. Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circle. Projectile.

CO3: Central orbits-p-r equations, Apses, Time in an orbit, Kepler's law of pl motion. Moment of inertia - M.I. of rods, Circular rings, Circular disks, Solid and spheres, Rectangular lamina, Ellipse and Triangle. Theorem of parallel axis. Prom inertia.

CO4: Equilibrium of coplanar force, moments and friction.

CO5: Virtual work and Catenary

## Course Outcomes of Physics: -

### Paper-1 Quantum Mechanics and Spectroscopy

<b>Unit-1</b>	<p>After completion of the course the students will have an understanding of -</p> <ol style="list-style-type: none"><li>1. Difficulties of classical mechanics to explain: the black-body emission spectrum, specific heat of solids. Planck quanta concept and radiation law, Photo electric effect and Einstein's explanations. Compton effect, De-Broglie hypothesis, diffraction and interference experiments of particle (Davisson—Germer experiment).</li><li>2. Uncertainty principle: position and momentum, angle and angular momentum, energy and time. Application of uncertainty principle: (i) Ground State energy of hydrogen atom, (ii) ground state energy of simple harmonic oscillator, (iii) Natural width of spectral lines, (iv) Non-existence of electron in nucleus.</li><li>3. Operators: linear operators, product of two operators, commuting and non—commuting operators, simultaneous eigen functions and eigen values, orthogonal wave functions. Hermitian operators, their eigen values, Hermitian adjoint operators. eigen values and eigen functions; expectation values of operators: position, momentum, energy; Ehrenfest theorem and complementarity, Concept of group and phase velocity, wave packet, Gaussian wave packet bracket notation</li></ol>
<b>Unit-2</b>	<p>After completion of the course the students will have an understanding of -</p> <ol style="list-style-type: none"><li>1. Schrödinger wave equation: general equation of wave propagation, propagation of matter waves, time dependent and time-independent Schrödinger equation, wave function representation (<math>\Psi</math>), physical meaning of <math>\Psi</math>, properties and conditions on <math>\Psi</math>, postulates of wave mechanics, operators, observable and measurements; probability current density.</li><li>2. Time independent Schrödinger equation, stationary state solution, one dimensional problem: particle in one dimensional box, eigen functions and eigen values, discrete energy levels, generalization into three dimension and degeneracy of energy levels, concept of a potential well and barrier, step potential, penetration through rectangular barrier, reflection and transmission coefficients, barriers with special shapes (graphical representation), quantum mechanical tunneling (alpha decay).</li></ol>
<b>Unit-3</b>	<p>After completion of the course the students will have an understanding of -</p> <ol style="list-style-type: none"><li>1. Symmetric square well potential, reflection and transmission coefficients, resonant scattering; Bound state problems: particle in one dimensional infinite potential well and finite depth potential well, energy eigen values and eigen functions, transcendental equation and its solution; Simple harmonic</li></ol>

	<p>oscillator, Schrödinger equation for simple harmonic oscillator and its solution, eigen function ,eigen values ,zero point energy, quantum and classical probability density, parity, symmetric and antisymmetric wave functions with graphical representation.</p> <p>2.Schrödinger equation in spherical coordinates, Schrödinger equation for one electron atom in spherical coordinates, separate ion into radial and angular variables, solution of radial equation and angular equation, qualitative discussion of spherical harmonics, series solution and energy eigen values ,stationary state wave function.</p> <p>Wave-functions of H-atom for ground and first excited states, average radius of H-atom, Bohr correspondence principle, orbital angular momentum and its quantization ,commutation relation ,eigen values and eigenfunctions,</p>
Unit-4	<p>After completion of the course the students will have an understanding of -</p> <ol style="list-style-type: none"> <li>1. Energy level derivation for H-atom, quantum features of hydrogen spectra and hydrogen like spectra, Stern-Gerlach experiment, electrons in ,spin magnetic moment. Spin-orbit coupling, qualitative explanation of fine structure, Franck—Hertz experiment, Zeeman effect, normal Zeeman splitting, Qualitative understanding about Stark effect.</li> <li>2. Absorption and emission spectroscopy, its block diagram, brief explanation about function of each elements and it's limitations; single beam spectrophotometer.</li> <li>3. Molecularspectroscopy: concept of rigid rotator, rotational energy levels ,rotational spectra, selection rules, intensity of spectral lines, isotopic effect; Vibrational energy levels, vibrational spectra ,selection rules, isotopic effect, effect of an harmonicity in vibrational spectra, vibrational—rotational spectra of CO and HCl molecules.</li> </ol>

## Paper-2 Nuclear and Particle Physics

Unit -1	<p>After completion of the course the students will have an understanding of -</p> <p>Discovery of Nucleus, Rutherford Scattering ,Constituents of the Nucleus; Mass ,Charge, Size, Nuclear Density, Charge Distribution, Hofstadter's experiment,</p> <p>Nuclear Angular momentum, Nuclear Magnetic Dipole Moment, Electric Quadrupole Moment, Spin, Isospin ,Wave Mechanical Properties: Parity and Statistics ,Classification of nuclei, Mass Defect and Binding Energy, Packing Fraction, Mass Spectrograph.</p> <p>Nuclear Forces: Properties of Nuclear Forces, Yukawa Meson Theory, Nuclear Potential.</p> <p>Nuclear Models: Segre Chart, Liquid Drop Model, Semi Empirical Mass Formula, Condition of Stability, Fermi Gas Model ,Evidence for Nuclear shell structure ,Nuclear Magic Numbers and Basic Assumptions of the Shell Model.</p>
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<p><b>Unit</b> -2</p>	<p>After completion of the course the students will have an understanding of -</p> <p>Radioactive Decays: Alpha Decay- Basics of <math>\alpha</math>- Decay Processes, Theory of <math>\beta</math>- Emission Spectrum ,Gammow Factor, Geiger Nuttal Law, Range of Alpha Particles,</p> <p>Beta Decay- Energy Kinematics for <math>\beta</math>-Decay ,<math>\beta</math>-Decay Spectrum, Positron Emission,</p> <p><b>Electron Capture, Pauli's Neutrino Hypothesis.</b></p> <p>Gamma Decay- Gamma Ray Emission and Kinematics , Internal Conversion Applications of Radioactivity</p> <p>Nuclear Fission and Fusion: Nuclear Fission, Spontaneous Fission and Potential Barrier, its Explanation by Liquid Drop Model, Chain reaction, Controlled chain reaction ,Four Factor Formula ,Nuclear Reactors ,Classification of Nuclear Reactor ,Uncontrolled Chain Reaction, Nuclear Fusion ,Energy released in Nuclear Fusion, Fusion in stars.</p> <p><b>Nuclear Reactions: Types of Reactions, Conservation Laws, Kinematics of Reactions , Q -Value, Threshold Energy ,Reaction Rate, Reaction Cross- Section.</b></p>
<p><b>Unit</b> -3</p>	<p>After completion of the course the students will have an understanding of -</p> <p>Interaction of Nuclear Radiation with Matter: Energy Loss by Heavy Charged Particles in matter, Interaction of Electrons with Matter, Range of Charged Particle, Bremsstrahlung, Cherenkov Radiation ,Gamma Ray Interaction With Matter.</p> <p>Radiation Detectors: Gas filled detector, Avalanche, Geiger Discharge, Ionization Chamber ,Proportional Counter, Geiger Muller Counter ,Current mode and Pulse Mode Operation of Detector. Particle Accelerators :Ion source, Van-de-Graff Accelerator (Tandem Accelerator), Linear Accelerator ,Cyclotron, Synchrocyclotron, Betatron, Proton Synchrotron</p>
<p><b>Unit-</b> 4</p>	<p>After completion of the course the students will have an understanding of -</p> <p>Elementary Particles :Necessity of high energy to discover elementary constituents, historical introduction to discovery of elementary particles (electron <u>positron</u>, neutrinos, strange mesons ,charm quark, intermediate vector bosons ,bottom quark, top quark and Higgs boson) Elementary particles and their quantum numbers (charge ,spin, parity, isospin,stangeness etc.),elementary particles included in the standard model.</p> <p>Fundamental Interactions Four types of fundamental forces. Symmetries and Conservation Laws, Diescrete symmetries C , P, and T in variance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction, CP violation. Quark Model: Flavor symmetries, Gellmann- Nishijima formula, the eight foldway, Quark</p>

	<p>model, Octet Diagram for Mesons and Baryons, Concept of Quark model, the November</p> <p><b>Revolution, Baryon Decuplet, Color Quantum Number and Gluons.</b></p>
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## Paper-3 Solid State Physics

<b>Unit-1</b>	<p>After completion of the course the students will have an understanding of -</p> <p><b>Bonding in Solids and Crystal structure:</b></p> <p>Force between atoms, Ionic bonds, Covalent and metallic bonds, Vanderwaal's and Hydrogen bonding. Periodicity in lattices, Basis, lattice point and space lattice, Translation vectors, Unit and primitive cell, Crystal systems, Packing fractions for Simple Cubic (SC), Body Centred Cubic (BCC), Face Centred Cubic (FCC) and Hexagonal lattice structures, Bravais space lattices.</p> <p><b>Crystallography and Diffraction:</b></p> <p>Direction, plane and Miller indices in a crystal lattice, Reciprocal lattice and its significance, Conversion of SC and FCC structures in reciprocal lattice frame, Concept of crystalline, poly crystalline and amorphous materials, X-ray diffraction by solids: Laue and Bragg's equation, Study of crystals by X-rays: FWHM, Scherrer formula and Lattice Constants (for simple cubic structure), Electron and Neutron diffraction (qualitative).</p>
<b>Unit-2</b>	<p>After completion of the course the students will have an understanding of -</p> <p>Formation of bands, Periodic potential and Bloch Theorem, Number of states in the bands, Kronig Penny model, Brillouin zones, Crystal momentum and physical origin of effective mass, Negative Effective Mass and Holes, Energy dispersion relations: weak and tight binding.</p> <p><b>Semiconductors:</b></p> <p>Energy band Structures in Insulators, Conductors, Semiconductors, Concept of Direct and Indirect band gap in semiconductors, Generation and recombination of charge carriers, Mobility of current carriers, Hall Effect in semiconductors: Hall coefficient, Mobility, Charge carrier concentration, Conductivity and Hall angle.</p>
<b>Unit-3</b>	<p>After completion of the course the students will have an understanding of -</p> <p><b>Thermal properties of Materials:</b></p> <p>Elastic waves, Phonon, Phonon dispersion relations in mono atomic and diatomic linear lattice. Lattice heat capacity, Classical theory of specific heat, Dulong-Petit's law, Einstein and Debye's theory of specific heat of solids and limitations of these models, concept of Thermoelectric Power.</p>

	<p>Electrical Properties of Materials:</p> <p>Drude-Lorentz theory, Sommerfeld's Model, Thermal conductivity, Electrical conductivity, Wemann- Franzrelation, Thermionic Emission ,Escape of electrons from metals,Hall effect in Metals ,Density of states</p>
<b>Unit-4</b>	<p>After completion of the course the students will have an understanding of -</p> <p>Classification of Magnetic Materials .Origin of Atomic Magnetism, Classical Langevin Theory of dia— and Para magnetic Domains. Quantum theory of Para magnetism. Curie's law, Weiss'sTheory of Ferro magnetism .Concept of Domain Wall, Magneto striction, Heisenberg's Exchange Interaction, Relation between Exchange Integral and Weiss Constant.</p> <p><b>Superconductivity:</b></p> <p>Experimental features of superconductivity: Critical Temperature, Critical magnetic field. Meissner effect.Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation Cooper Pair and Coherence length Josephson Effect (No derivation).</p>

### BSc. ZOOLOGY

#### Final year (Annual Scheme)

After completion of this course, the student will have an understanding of the following:

Course	Outcomes
<p><b>Paper-1:</b></p> <p><b>STRUCTURE AND FUNCTIONS OF CHORDATE TYPES</b></p>	<p>CO1: Comparison of habit. external features and anatomy of Herdmania, Branchiostoma (excluding development)., Ascidian tadpole larva and its metamorphosis, Affinities of Hemichordata, Urochordata and Cephalochordate, Petromyzon, Ammoecoete larva.</p> <p>CO2: Structure and development of placoid scales, feathers and hair.</p> <p>CO3: Comparative anatomy of vertebrates including various systems</p> <p>CO4: Chordate Adaptations including, Flight adaptations, in birds and bird migration and Adaptive radiation in Mammals.</p> <p>CO5: Scales and fins, migration and parental care in Pisces, Parental care. in Amphibia, Poisonous and non-poisonous snakes, poison apparatus.</p>



<p><b>Paper-2:</b></p> <p><b>ECOLOGY AND ENVIRONMENTAL BIOLOGY</b></p>	<p>CO1: Basic concepts in ecology, Its meaning and history.</p> <p>CO2: Ecosystem: Production, consumption and decomposition in an ecosystem: Concepts of food-chain. food web, trophic structure, ecological pyramids</p> <p>CO3: Population ecology, Community ecology, Habitat Ecology</p> <p>CO4: Environmental Biology, Natural resources</p> <p>CO5: Environmental pollution</p> <p>CO6: Wildlife conservation, Impact of urbanization</p> <p>CO7: Space ecology: Space ecosystem, space problems and their solutions, colonization.</p>
<p><b>Paper-3:</b></p> <p><b>APPLIED ZOOLOGY, ETHOLOGY AND BIOSTATISTICS</b></p>	<p>CO1: Principles and Practices of the following: Vermiculture. Sericulture, Apiculture, Prawn culture, Poultry keeping, Pisciculture.</p> <p>CO2: Economic Importance of the following: Protozoa, Corals and coral reefs, Helminthes, Arthropods; Insects and their management, Mollusca: Outline idea of pearl culture.</p> <p>CO3: Concepts of Ethology, Methods of studying brain behavior: Neuroanatomical, neurophysiological and neurochemical techniques.</p> <p>CO4: Pheromones and their role in alarm spreading, biological rhythms and biological clocks.</p> <p>CO5: Introduction, scope and application of Biostatistics.</p> <p>CO6: Frequency distribution, Graphical and tabular presentation of data, Mean. median, mode and their significance, Standard deviation, standard error and their significance, Hypothesis: Null and alternative: Student's t- test.</p>

**Course Outcomes M. A. (History) Annual Scheme**

On completing the study, the student will have a clear understanding of the following:

<p>Paper I</p> <p>ANCIENT INDIAN HISTORY (200 BC. TO 750 A.D.)</p>	<p>CO1: A survey of the sources for ancient Indian history from c. 2 B.C. to 750 A.D. Political and Cultural history of the Sungas, King Kharavela of Kalinga and his achievements. Origin and early history of the Satavahanas upto Satkarni, Rise of the Kushanas: Kanishka- date, political and cultural achievements, Early history of the Sakas in India Western Kshatrapas-</p>
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	<p>Nahapana and Rudradaman 1 and their achievements. Economic condition of India from 200 B.C. to 300 AD with special reference to Trade and Commerce. A study of the social religious life and developments in art and architecture, literature and education during the period c. 200 B.C. - 300 A.D.</p> <p>CO2: Rise of the Imperial Guptas - Origin and early history. Expansion and consolidation of Gupta empire under Samudragupta and Chandragupta II. Nature of Gupta state and administrative organisation. Hun invasion and its impact. Decline of the Gupta empire. Survey of social and religious life during the Gupta age. Economic conditions of the Gupta period - Land grants, agriculture, crafts, coinage and currency. Developments in art and architecture, literature and sciences during the Gupta age.</p> <p>CO3: Harshavardhana - his conquests, administration and cultural achievements. Emergence of Feudalism. Accounts of Fahien and Yuan-Chwang. Political and cultural achievements of Pallavas and Chalukyas upto 750 A.D.</p>
<p>Paper II (i) Social and Economic Life in Ancient India</p>	<p>CO1: Concept of Dharma as the basis of Indian Society. Concept, origin and a historical-cultural study of Varna and Jati. Ashramas, Purusharthas and Sanskaras - Objective, types and significance: concept and prevalence of asceticism in ancient India. Institution of family and Marriage.</p> <p>CO2: A survey of the position of Women in ancient India. Education-a survey of the evolution of Vedic, Buddhist and Jaina systems of education. Ancient Indian economic thought: meaning and significance of Varta. Economic systems and institutions: Land ownership; Land revenue and other forms of taxation; Feudalism -a brief survey of the debate over Feudalism in India; Economic guilds; Credit and Banking, slavery and labour.</p> <p>CO3: Stages in ancient Indian economy: Chalcolithic village economy, Harappan economy. Vedic agriculture. Urban and Industrial economy during the age of Mahajanapadas. Mauryan Imperial Economy. Trade commerce during the period c. 200 B.C. to 300 A.D. Economic progress in the Gupta period. South Indian temple economy</p>
<p>Paper III(i) Ancient Indian Art and Architecture</p>	<p>CO1: Characteristics of Indian Art Prehistoric Rock Art. Indus Saraswati civilization: town planning and architecture, sculptures and seals. Mauryan Art: Pillars and Folk Art (Yaksha sculptures). A study of art and architecture of Stupas at Bharhut, Sanchi and Amaravati. Mathura School of Art. Gandhara School of Art.</p> <p>CO2: Buddha image. Gupta art - a study of sculptures, Ajanta paintings.</p>

	<p>CO3: Origin, evolution and many styles of Hindu Temples-development of temples in post-Gupta period. Northern India- Temples of Orissa, Khajuraho and Abu. South India- Rock cut temples of Mahabalipuram, Kailash temple of Ellora and Chola temples</p>
<p>Paper-IV: (v) INDIAN NATIONAL MOVEMENT AND THOUGHT</p>	<p>CO1: Approaches to Indian Nationalism - Conceptual debates Emergence of organized nationalism. Political Associations and the Indian National Congress. Contribution of Moderates and Extremists to the National Movement. Swadeshi Movement. Home Rule Movement Constitutional Developments upto 1919. Role of Terrorists and Revolutionaries with Special Reference to Chandra Shekhar and Bhagat Singh.</p> <p>CO2: Rise of Gandhi. Gandhi's career, ideology and methods of mass mobilisation. Nature of Gandhian Movements Non-Cooperation movement, Civil Disobedience Movement and Quit India Movement The Left Movements - Socialists and Communists. States' Peoples Movements.</p> <p>CO3: Growth of Separatism - Aligarh Movement, Muslim League Hindu Mahasabha. Subhash Chandra Bose and the Indian National Army. Peasants and Workers' Movements. Depressed Classes Movements. Women in the Indian National Movement.The Act of 1935. Communal Politics and Partition. Transfer of Power and Indian Independence (15 August, 1947).</p>
<p>Paper V Main Trends in the History and Culture of Rajasthan</p>	<p>CO1: Geographical Features of Rajasthan and their Impact on it History and Culture. Advent of man of prehistoric cultures in Rajasthan. Hub of Chalcolithic and Copper age cultures in Rajasthan (Alwar, Balathal, Ganeshwar) Rock Art in Rajasthan. A brief survey of historic Rajasthan from B.C. 600-700 A.D.-Matsya Janapada, Republican Tribes, Origin of the Rajputs. Guhilas of Medapata. Political and Cultural Achievements of Gurjar-Pratiharas and Chakamanas.</p> <p>CO2: Rajput Resistance to Mughal invasions. Political and Cultural Achievements of Maharana Kumbha and Sanga. Estimate of Maharana Pratap. Contribution of Maldeo of Marwar. Role of Chandrasen. Emergence of Amber Principality as a Major State in Rajasthan: Mirja Raja Jai Singh, Sawai Jai Singh. Religious Movements: Mirabai, Dadu Panthis, Folk deities. Art and Architecture: Forts, Temples, Sculptures, Rajput Schools of Painting.</p> <p>CO3: Maratha influence in Rajasthan. Acceptance of British Dominance and its Consequences. Administrative and Judicial Changes after 1818. Social Changes - Prohibition of Female Infanticide and Sati Economic Changes, Land Revenue Settlements. British Monopoly of salt and Opium Trade Echoes of 1857 outbreak in Rajasthan. Agrarian unrest and Movements. Tribal</p>

	<p>Movements. Formation of Raj Mandals, influence of Nationalism and Freedom Struggle in Rajasthan. Economic developments in post-independence Rajasthan. Cultural Profile of Rajasthan - Rajasthani Language, Dance and Literature; Folk Arts and Handicrafts, Fairs, Festivals, Custom Dresses and Ornaments, Developments in Music, Dance and Theatre.</p>
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## Political science

### (VII) - Research Methodology

#### Section-A

Need and Nature of Research in Political Science. Forms of Research: Normative, Empirical and Behavioural, Policy Analysis, Inter-disciplinary Research, The Scientific Method, Various forms of Studies Panel, Case, & Area.

#### Section-B

Formulation of Research Problem, Research Designs, Experimental Research Designs, Concepts and Hypothesis, Selection of Universe: Source of data: Primary and Secondary, Sampling, Techniques of data-collection, Observation, Questionnaire & Schedule,

#### Section-C

Concept of Property and Space, Coding and Tabulation, Data Analysis, Report Writing,

Theory Building in Political Science.

## हिन्दी विभाग स्नातक एवं स्नातकोत्तर पाठ्यक्रम

### Programme Outcomes

व निर्धारित पाठ्यक्रम के अतिरिक्त भाषा एवं व्याकरण का अध्ययन-अध्यापन उनके व्याकरण के ज्ञान में वृद्धि करता है, जिससे वे भाषा के शुद्ध स्वरूप को जानने-समझने में सक्षम होते हैं।

व भाषा का ज्ञान बढ़ने से उनका आत्मविश्वास बढ़ता है, जिसका प्रभाव उनकी अन्य गतिविधियों में भी दिखायी देता है। साहित्य के अध्ययन से उनका संवेदनात्मक एवं कलात्मक पक्ष मजबूत होता है।

व आधुनिक साहित्य की जानकारी छात्र-छात्राओं को देना जिससे वे साहित्य की नवीनतम गतिविधियों से जुड़े रह सकें।

व इसमें छात्र-छात्राओं को विषय हिन्दी साहित्य के आदिकाल, भक्ति काल, रीतिकाल और आधुनिक काल के साहित्य का अध्ययन कराया जाता है। इसमें गद्य और पद्य दोनों का विषद विवेचन कराया जाता है।

व इस अध्ययन से छात्र-छात्राओं को विषय का विस्तृत ज्ञान कराया जाता है, जिससे उनकी विषय के प्रति रुचि जागृत होती है। और उनकी विप्लेषणात्मक क्षमता विकसित होती है।

व साहित्य के अध्ययन से सामाजीकरण की प्रक्रिया में मदद मिलती है।

व एक कुषल एवं उत्तरदायी नागरिक बनने में साहित्य की भूमिका बहुत महत्वपूर्ण होती है, क्योंकि साहित्य में भले-बुरे, नैतिक-अनैतिक सभी पक्षों पर चर्चा होती है।

व अपने परिवेष और पर्यावरण के प्रति जागरूकता उत्पन्न की जाती है।

व इस प्रकार साहित्य के माध्यम से हम जीवन से जुड़े पहलू पर ध्यान देते हैं और छात्र-छात्राओं को उसके प्रति जागरूक बनाते हैं।

व स्नातक तथा स्नातकोत्तर पाठ्यक्रम में हिन्दी साहित्य की एक विषय के रूप में उपादेयता मानवीय व सामाजिक रूप से तो महत्वपूर्ण है ही साथ ही आजीविका का एक उत्कृष्ट माध्यम भी है।

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orZeku ds fy, izsj.kk vkSj uohu ÅtkZ dk lapkj gksrk gS rFkk dbZ  
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There will be five questions in all. The candidate will require to attempt all the questions selecting one question from each unit with an internal choice (either/or).

M.Com-ABST (Previous) 2015-16

CPI DIRECT TAXES

CP2 ADVANCED COST ACCOUNTING

CP3 RESEARCH METHODOLOGY AND ADVANCED BUSINESS  
STATISTICS

(One Optional Paper from the list of Optional Papers)

Optional paper

## OP6 COST & MANAGEMENT AUDIT

M.qwn -ABST (Final)

CP4 INDIRECT TAXES

CP5 ADVANCED ACCOUNTANCY

CP6 MANAGEMENT ACCOUNTING AND FINANCIAL REPORTING

(Two Optional Paper from the list of Optional Papers)

## OPTIONAL PAPERS

OPT TAX PLANNING

OP2 COST ANALYSIS AND COST CONTROL

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**M.Com previous EA FM**

There will be five questions in all. The candidates are required to attempt all the questions. There will be one question from each unit with an internal choice (either/or).

**Compulsory Papers:**

EAFM-IOI Economic Analysis

EAFM-102 Financial Management a. Control

**Optional Papers (Any Two) Economic Administration Group**

EA.103 Public Enterprises

EA-104 Industrial Economics

**Optional Paper (Any Two) : Financial Management Group**

FM-103 Business Budgeting

FM-104 Public Finance

M.COM. (FINAL) EAFM

Compulsory Papers

EAFM-201	Economic Administration & Policy
EAFM-202	Cooperative Sector Management
EAFM-203	Indian Banking System

Optional Papers (Any Two) : Economic Administration Group

EA-205	Economic Environment in India
EA-206	Development Economics

Optional Papers (Any Two) : Financial Management Group

FM-204	International Banking
FM-205	Bank Management

