

	<p>b) Current electricity: Kirchoff's laws and their applications, Biot-Savart law, Ampere's law, Faraday's law, Lenz's law. Self and mutual inductances. Mean and rms values in AC circuits. DC & AC circuits with R, L and C components. Series and parallel resonances. Q-factor. Basic principle of transformer.</p> <p>c) Electromagnetic theory: Displacement current and Maxwell's equations. Wave equations in vacuum, Poynting theorem. Vector and Scaler potentials. Normal and anomalous dispersion.</p> <p>5. Thermodynamics: Laws of thermodynamics, change of entropy in different processes. Maxwell's relations and its applications. Clausius - Claperyon equation. Gibbs' phase rule and chemical potential. Joule-Thomson effect and liquification of gasses.</p>
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Paper – II :	<p>1. Quantum Mechanics: Wave-particle duality, Schrödinger equation and expectation value, uncertainty principle, Solutions of the one-dimensional Schrödinger equation for a free particle (Gaussian wave-packet) particle in a box, particle in a finite well, linear harmonic oscillator, Reflection and transmission by a step potential and by a rectangular barrier. Particle in a three dimensional box. Angular momentum. Hydrogen atom. Spin. Spin half particle, properties of Pauli spin matrices.</p> <p>Stern - Gerlach experiment, electron spin, fine structure of hydrogen atom, L-S coupling, J-J coupling, Spectroscopic notation of atomic states, Zeeman effect, Raman Effect and molecular structure, Laser Raman spectroscopy.</p> <p>2. Statistical Physics: Macro and micro states. Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distributions. Partition function. Distribution of molecular velocities in ideal gasses, equipartition theorem. Specific heat of solids, Einstein and Debye theory. Blackbody radiation, Planck's law, Stefan Boltzmann law. Rayleigh-Jeans formula and Wein's displacement law. Specific heat of electrons at low temperature.</p> <p>3. Nuclear and Particle Physics: Basic nuclear properties - size, binding energy, angular momentum, parity, magnetic moment; Semi-empirical mass formula and applications, mass parabolas; Shell model of the nucleus-successes and limitations; Violation of parity in beta decay; Q-value of nuclear reactions; Nuclear fission and fusion, energy production in stars; Classification of elementary particles and their interactions; Conservation laws;</p> <p>4. Solid State Physics: Crystalline and amorphous structure of matter; Different crystal systems. Methods of determination of crystal structure; X-ray diffraction; Band theory of solids-conductors, insulators and semiconductors; Magnetism; dia, para and ferromagnetism; Elements of superconductivity,</p> <p>5. Electronics: Intrinsic and extrinsic semiconductors, p-n-p and n-p-n transistors, Amplifiers, Oscillators-Hartley, Weinbridge and crystal oscillators, Op-amps, FET, JFET and MOSFET. Digital electronics-Boolean identities. De Morgan's laws. Logic gates and truth tables. Simple logic circuits.</p>
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POLITICAL SCIENCE :

Paper – I :	<p style="text-align: center;"><u>Group – A</u></p> <p>Western Political Thought - Plato, Aristotle, Machiavelli, Rousseau, Bentham, J. S. Mill, Marx.</p> <p>Indian Political Thought - Kautilya, Rammohan Roy, Vivekananda, Syed Ahmed Khan, Rabindranath, Gandhi, Ambedkar.</p> <p>Political Concepts - State, Civil Society, Government, Governance, Power, Authority, Nation, Nationalism, Internationalism.</p> <p>Political Ideas - Rights, Duties, Liberty, Equality, Justice, Rule of Law, People Participation.</p> <p>Political Ideologies - Liberalism, Democratic Socialism, Feminism, Terrorism.</p> <p>Different aspects of Democracy - Meaning and Theories of Democracy; Direct vs Representative Democracy; Electoral System; Electoral Reforms.</p> <p>Political Process - Party System, Single Party, Bi Party, and Multi Party Systems; National Parties and Regional Parties; Lobbyists and Pressure Groups.</p> <p>Forms of Government - Dictatorial vs Democratic; Totalitarian vs Liberal. Presidential vs Parliamentary, Unitary vs Federal.</p> <p>Social Movements - Environmental movements, Women's movements, Human rights movements.</p>
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	<p style="text-align: center;"><u>Group-B</u></p> <p>Basic features of Indian Constitution - Constituent assembly, Salient Features of the Indian Constitution, Nature of Indian Federation, Centre-State relations, Legislative, Executive and Financial-Fiscal dimensions, Evolving political trends.</p> <p>Fundamental Rights - Directive Principles & Fundamental duties - Constitutional provisions and judicial interpretations regarding fundamental rights.</p> <p>Union Legislature - Composition, Powers and Functions of Lok Sabha and Rajya Sabha, Functioning of the Committee System.</p> <p>Union Executive - President, Vice President - Election, Position, Functions, Prime Minister, Council of Ministers, Relationship between President and Prime Minister.</p> <p>The Judiciary - Supreme Court and the High Courts, Composition and Functions, Judicial review and Judicial activism, Public interest litigations, Judicial reforms.</p> <p>Government in the States - Governor, Chief Minister and Council of Ministers, Position and Functions.</p> <p>State Legislature - Composition and Functions.</p> <p>Local Government and Politics - Panchayati Raj: Evaluation, Structure, Powers and Functions, Municipal Government; Significance of 73rd and 74th amendments; Role of women, SCs & STs in Local Government.</p> <p>Bureaucracy - Classical administration and Development Administration; Changing role of bureaucracy in Post-Colonial India, "Representative" bureaucracy, Issues of bureaucratic accountability.</p> <p>Social Processes - Role of Peasants and Workers in Indian Politics; Role of Interest / Pressure Groups; Regionalism, Casteism, Linguism and Communalism in Indian Politics; Issues of Criminalisation, Corruption; Citizens' movements.</p>
Paper – II :	<p style="text-align: center;"><u>Public Administration and International Relations</u></p> <p style="text-align: center;"><u>Group - A</u></p> <p>Public Administration</p> <p>Theories of Administration - Scientific Management, Classical Theory, Weber's theory of bureaucracy, Riggsian Model of Ecological Approach to Public Administration.</p> <p>Forms of Public Organizations - Ministries and Departments; Corporations, Boards and Commissions.</p> <p>Principles of Organization - (a) Hierarchy (b) Unity of Command (c) Span of Control (d) Authority (e) Centralization, Decentralization and Delegation, (f) Line and Staff.</p> <p>Processes of administration - (a) Decision - making and Policy Formulation (b) Communication and Control (c) Leadership (d) Co-ordination.</p> <p>Accountability and Control - Legislative, Executive and Judicial Control over administration; Role of Civil Society; Public opinion and Media; Right to Information; Administrative Corruption; Grievance Redressal Mechanisms like Ombudsman.</p> <p>Development Administration - Evolution of the Concept; Basic features.</p> <p>Control of Public Expenditure - Parliamentary Control, Control of Parliamentary Committees;</p> <p>Indian Administration - Continuity and Change - brief historical outline.</p> <p>Recruitment and Training of Civil Servants in India - Role of Union and State Public Service Commissions and Training Institution.</p> <p>Organization of the Union Government in India - PMO, Cabinet Secretariat, Secretariat Administration.</p> <p>Organization of the State Governments in India - Chief Secretary - Relationship between Secretariats and Directorates.</p> <p>District Administration in India - Changing role of District Officers, Sub-divisional Officers & Block Officer; their interfaces with Local Self Government.</p> <p style="text-align: center;"><u>Group-B</u></p> <p>International Relations</p> <p>Some Basic Concepts of International Relations - (a) Balance of Power (b) Collective Security (c) Bipolarity and Unipolarity (d) Neo-Colonialism (e) Globalization.</p>

Foreign Policy - Concept and Techniques; Determinants of foreign policy. Evolution of World Politics - League of Nations; United Nations; Cold War; Detente; Collapse of the Soviet Union; Regional Integrations; International Terrorism.

Non-Alignment - Evolution of the Movement and Role of India.

Major Issues in Indian Foreign Policy - Sino-Indian relations, Indo-Pak conflicts and the liberation of Bangladesh, developments in Sri Lanka, Indian role in promoting regional cooperation through S.A.A.R.C., the Kashmir question and India becoming a nuclear power. India and South East Asia; India's relations with U.S.A., China, Japan & Russia. India on the question of nuclear weapon. India and the U.N. system-India's role in U.N. peace keeping and global disarmament. India and the emerging international economic order.

Recent Global Issues - Egypt, Lebanon and Lybia.

PSYCHOLOGY :

Paper - I :

Basic psychological processes and development

Scope and Methods of Psychology - Biological basis of behaviour

2. Cognitive Processes:

- A) Sensation: attributes of sensation, psychophysics (weber-Fechner Law), Methods of Pscychophysics
- B) Attention: determinants of attention, fluctuation of attention, selectivity of attention
- C) Perception: Movement, space, depth and time perception, perceptual organization, Gestalt View

3. Learning.: Conditions of Learning

- Theory of classical conditioning
- Theory of operant conditioning
- Trial and error theory
- Theory of insight learning
- Programmed learning

4. Memory: Encoding, storage, retrieval

- Types of Memory (STM & LTM, ICONIC, Echoic & Procedural)
- Forgetting curve
- Theories of forgetting

5. Motivation and Emotion: Physiological and psychological basis of motivation and emotion

- Intrinsic and extrinsic motivation - factors influencing intrinsic motivation
- Theories of motivation - Maslow, Mcclelland
- Theories of Emotion - James-Lange Theory, Canon-Bard and Schachter-Singer Theory
- Effects of Motivation and emotion on behaviour

6. Intelligence

- Spearman's two factor theory
- Thurstone' s theory
- Guilford's structure of intellect
- Gardner's theory
- Measurement of intelligence - IQ & deviation IQ, Tests of intelligence - Stanford Binet
- Types of intelligence - Social, abstract, concrete, emotional, artificial, spiritual
- Gifted and mentally challenged children

7. Thinking

- Piaget's theory of cognitive development ~ Problem solving
- Creative thinking - Nature and stages

8. Attitude, Values and Interest

- Definition of attitude, values and interests
- Value - concept, development and measurement
- Attitude - formation, measurement and change concept
- Stereotype, prejudice, discrimination
- Measurement, reduction of prejudice

9. Interest - concept and measurement