Plan of Written Examination

All the aspirants are informed as under with respect to the written test to be conducted for the recruitment of ***Senior Technical Assistant*** *:-*

(i) *The Exam will be conducted in MCQ (Multiple Choice Questions) format. OMR sheets will be used for answering the questions.*

(ii) *There will be negative marking. Each question carries 1 mark.* ***For every wronganswer, 1/4th mark would be deducted. The question(s) not attempted will receive no credit or discredit.***

(iii) *The test would be of 2 hours duration.*

iv) *Pattern of the written competitive examination is as follows:-*

Sr. No.	Topic	No. of Questions	Marks (Each Question carries 1 mark)	Type of Questions
1.	Questions from the Subject (Part A of Syllabus)	90	90	MCQs (Multiple Choice Questions)
2.	Questions from General Knowledge, English, Punjabi, Logical Reasoning and Mental ability (Part B of Syllabus)	30	30	
Total		**120**	**120**	

v) *Candidate can opt for any of the four subjects as per his/her subject in Master's degree (i.e Chemistry, Geology, Mathematics and Economics)*

vi) *Tentative syllabus for the written examination for the recruitment of* ***Senior Technical Assistant*** *is annexed at Annexure-1 and 2.*

Annexure-I

Part A-Subject Syllabus(Senior Technical Assistant)

1.CHEMISTRY:

PHYSICAL CHEMISTRY

Quantum theory: principles and techniques, applications to a particle in a box, harmonic oscillator, rigid rotor and hydrogen atom; valence bond and molecular rbital theories, Hückel approximation; approximate techniques: variation and perturbation, symmetry elements; point groups; character (ables; selection rules. Chemical applications of group theory, term symbols; many-electron systerns, Chemical bonding in diatomics: Huckel theory for conjugated a-electron systems. Spectroscopy, rotational, vibrational, electronic, NMR, and ESR spectroscopy.

Equilibrium: Kinetic theory of gases, First law of thermodynamics, heat, energy, and work, second law of thermodynamics and entropy; third law and absolute entropy: free energy; partial molar quantities; ideal and non-ideal solutions; phase transformation: phase rule and phase diagrams - one, two, and three component systems, activity, activity coefficient, fugacity, and fugacity coefficient; chemical quilibrium response of chemical equilibrium to temperature and pressure; colligative properties.

Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; molecular partition function (translational, rotational, vibrational, and electronic). partition functions and their relation to thermodynamic quantities- calculations for model systems.

Electrochemistry: Nernst equation, thermodynamics of electrochemical cells; standard electrode potentials: corrosion and energy conversion; redox systems, electrochemical cells in Debye-Huckel theory; electrolytic conductance Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.

Kinetics: Rates of chemical reactions, temperature dependence of chemical reactions; elementary, consecutive, and parallel reactions; steady approximation; theories of reaction rates collision and transition state theory. relaxation kinetics. kinetics of photochemical reactions and free radical polymerization, homogeneous catalysis, adsorption isotherms and heterogeneous catalysis.

Colloids and surfaces: Stability and properties of colloids, isotherms and surface area; heterogeneous catalysis.

INORGANIC CHEMISTRY

Main group elements: General characteristics, allotropes, structure and reactions of simple and industrially important compounds: boranes. carboranes, silicones, silicates, boron nitride, borazines and phosphazenes. Hydrides, oxides and oxoacids of pnictogens P), chalcogens (S, Se &Te) and halogens, xenon compounds, pseudo halogens and interhalogen compounds. Shapes of molecules and hard-soft acid base concept. Structure and Bonding (VBT) of B, Al, Si, N, P. S. Cl compounds. Allotropes of carbon: graphite, diamond, C60. Synthesis and reactivity of inorganic polymers of Si and P.

Transition Elements: General characteristics of d and f block elements, coordination chemistry: structure and isomerism, stability, theories of metal ligand bonding (CFT and LFT), mechanisms of substitution and electron transfer reactions of coordination complexes. Electronic spectra and magnetic properties of transition metal complexes, lanthanides and actinides. Metal carbonyls, metal- metal bonds and metal atom clusters, metallocenes: transition metal complexes with bonds to hydrogen, alkyls, alkenes and arenes; metal carbenes; use of organometallic compounds as catalysts in organic synthesis. Bioinorganic chemistry of Na, K. Mg, Ca, Fe, Co. Zn. Cu and Mo.

Organometallic compounds: Synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis. Cages and metal clusters. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron- transfer reactions; nitrogen fixation, metal complexes in medicine.

ORGANIC CHEMISTRY

Solids: Crystal systems and lattices, miller planes, crystal packing, crystal defects: Bragg's Law, ionic crystals, band theory, metals and semiconductors. Different structures of AX, AX2, ABX3 compounds, spinels.

Instrumental methods of analysis: Atomic absorption and emission spectroscopy including ICP-AES, UV- visible spectrophotometry, NMR, Mass. Mossbauer spectroscopy (Fe and Sn), ESR spectroscopy. Chromatography [1:52 PM, 6/9/2022] NakshMehra: Including GC and HPLC and electro-analytical methods (Coulometry, cyclic Joltammetry, polarography - amperometry, and ion selective electrodes).

ORGANIC CHEMISTRY

Stereochemistry: Chirality of organic molecules with or without chiral centres. Specification of configuration in compounds having, one or more stereogeniccentres.Enantiotopic and diastereotopic atoms, groups

and faces.Stereoselective and stereospecific synthesis.Conformational analysis of acyclic and cyclic compounds.Geometrical isomerism.Configurational and conformational effects on reactivity and selectivity/specificity.

Reaction mechanism: Methods of determining reaction mechanisms. Nucleophilic and electrophilic substitutions and additions to multiple bonds.Elimination reactions. Reactive intermediates carbocations, carbanions, carbenes, nitrenes, arynes, free radicals. Molecular rearrangements involving electron deficient atoms.

Organic synthesis: Synthesis, reactions, mechanisms and selectivity involving the following alkenes, alkynes, arenes, alcohols, phenols, aldehydes. ketones, carboxylic acids and their derivatives, halides, nitro compounds and amines. Use of compounds of Mg. Li, Cu. B and Si in organic synthesis.Concepts in multistep synthesis- retrosynthetic analysis.disconnections. synthons, synthetic equivalents, reactivity umpolung, selectivity, protection and deprotection of functional groups.

Pericyclic reactions: Electrocyclic, cycloaddition and sigmatropic reactions. Orbital correlation, FMO and PMO treatments.

Photochemistry: Basic principles. Photochemistry of alkenes, carbonyl compounds, and arenes.Photooxidation and photoreduction.Di-n-methane rearrangement, Barton reaction.

Heterocyclic compounds: Structure, preparation, properties and reactions of furan, pyrrole, thiophene, pyridine, indole and their derivatives.

Biomolecules: Structure, properties and reactions of mono- and di saccharides, physicochemical properties of amino acids, chemical synthesis of peptides, structural features of proteins, nucleic acids, steroids, terpenoids, carotenoids, and alkaloids.

Spectroscopy: Principles and applications of UV-visible, IR, NMR and Mass spectrometry in the determination of structures of organic molecules.

2. Mathematics:

1- **Differential and Integral Calculus:**Partial Differentiation, Euler's Theorem for homogeneous functions, Total Differentiation, Maxima and Minima for two variables, Lagrange's multipliers, curvature, Asymptotes, Envelopes, Singular Points. Rectification, Multiple Integral and applications.

2- **Polar Coordinate Geometry**: Polar equation of conics, Polar equation of tangent, normal and asymptotes, chord of contact, auxiliary circle, director circle of conics.

3- Three Dimensional Coordinate Geometry: Plane, Straight Line, Sphere, Cylinder, Cone (Rectangular Coordinates only), Central Conicoids (Referred to principle axes only).

4- Vector Calculus: Differentiation and Integration of Vectors, Curl, Gradient and Divergence, their identities and related theorems.

5- Ordinary Differential Equations: First order linear and non-linear differential equation, singular solutions and extraneous Loci, Second order linear differential equation with constant and variable coefficients.

6- Partial Differential Equations: Partial differential equation of first and higher order (Lagranges, Charpit's and Monge's Method).

7- Mechanics:Equilibrium of coplanner forces, moments, friction, catenary. Simple harmonic motion, Rectilinear motion under variable laws, Motion in resisting medium. Projectile.

8- Abstract Algebra :Groups: Normal Sub-groups, Quotient groups,Homomorphism, Isomorphism of groups. Classification for finite groups. Cauchy's Theorem for finite abelian groups, Permutation groups, Solvable groups, Jordan Holder Theorem, Nilpotent groups, Rings, morphism, Principal Ideal domain, Euclidean Rings, Polynomial Rings, irreducibility criteria, Fields, finite fields, field extensions. Integral domain.

9- Linear Algebra: Vector Spaces, Linear dependence and independence, Bases, Dimensions. Linear transformations, Matrix representation of Linear transformations, Change of base, Algebra of Matrices, System of linear equations, Determinants, Eigenvalues and Eigenvectors, Cayley-Hamilton theorem, canonical forms, diagonal forms, triangular forms, Jordan forms, Inner product spaces, orthonormal basis, Quadratic forms, reduction and classification of quadratic forms.

10- Complex Analysis: Analytic Functions, Cauchy's Theorem, Cauchy's Integral Formulae, Power Series, Laurent's Series, Singularities, Theory of Residues, Meromorphic functions, Transformations, Contour Integration.

11- Special Functions: Beta and Gamma Functions, Hypergeometric Functions, Bessel Functions, Legendre Function of first kind. Hermite Polynomials, Laguerre Polynomials.

12- Integral Transforms: Laplace transform, Inverse Laplace transform, convolution theorem, Fourier transform, Inverse Fourier transform, Parseval theorem. Hankel transform, Mellin transform.

13- Differential and Integral Equations: Classification of second order Partial Differential Equations, Green's Functions, Sturm-Liouville Boundary Value Problems, Cauchy's problems and Characteristics, Calculus of variation, Euler-Lagrange equation. Integral Equations of first and second kind of Fredholm and Volterratype.Solution by successive substitutions and successive approximations.

14- Metric spaces. and Topology: Metric spaces, compactness, connectedness,, Topological spaces, closed sets, closure, Dense set, Neighbourhood. Interior, exterior and boundary points, Accumulation points and derived sets.Bases and sub-bases. First and second countable spaces, separable spaces, Separation axioms, compactness, continuous functions and compact sets, connected spaces.

15- Differential Geometry: Curves in space, (Osculating plane, Normal plane. rectifying plane, Serret-Frenet formulae, curvature torsion, circle of curvature, Sphere of curvature), envelopes, curves on sufaces.

16- Tensors: Covariant, Contravariant and mixed tensors, Invariants, Addition, Subtraction and Multiplication of tensors, Contraction of tensors, Quotient law of tensors, Fundamental tensors, Associated tensors, Christoffel symbols, Covariant differentiation of tensors, Law differentiation. of covariant

17. Mechanics:D'Alembert's Principle, Moment and product of inertia, Motion in two-dimensions. Lagrange's equations of motion, Euler's Equations of motion, motion of a top.

18- Numerical Analysis: Interpolation, Difference schemes, Lagrange interpolation, Numerical differentiation and integration, Bisection, Secant, Regula-Faisi and Newton's Methods, Roots of polynominal. Linear Equation-Direct Methods (Jacobi, Gauss and Siedal Method).

19- Operations Research: Simplex methods, Duality, Degeneracy, Revised Simplex method, Integer Programming Problems, Assignment problems, Transportation Problems, Game Theory - Two person zero sum game.

20- Mathematical Statics: Probability, conditional Probability, Addition and multiplication theorems of probability, Baye's Theorem, Expectations, Moment Generating Function, Probability Distributions Binomial, Poisson, Uniform and Normal, Correlation and Regression.

3. Geology:

(i) Physical Geology, Structural Geology, Tectonics and Remote Sensing

- Earth as a part of the Solar System, its origin, evolution and composition. Endogenic and Exogenic processes of the Earth. Landforms; their origin and evolution.
- Distribution of continents and oceans, basic idea about oceanic crust and ocean surface morphology, continental crust (cratons, shield areas and terranes). Theory of Continental Drift. Concept of Sea floor spreading and evolution of Plate Tectonics theory. Mountain Building processes and evolution of Himalaya. Tectonic subdivisions of India. Theory of Isostasy. Structure and geological characteristics of Island Ares, Mid Oceanic Ridges, Rift Valleys, Oceanic Trenches, and their distribution.
- Seismicity, origin and classification of earthquakes, seismic waves, magnitude and intensity of earthquakes, world distribution of earthquakes and seismic zones of India. Seismicity and interior of the Earth. Volcanoes: their types, distribution and products, submarine volcanism. Seismicity and volcanism in relation to Plate Tectonics.
- Mechanical principles and properties of rocks and their controlling factors. Theory of rock failure. Concept of stress and strain. Two-dimensional strain and stress analyses. Types of strain ellipses and ellipsoids, their properties and geological significance. Strain makers in naturally deformed rocks.
- Folds; morphology and classification. Mechanics of folding and buckling. Fold development and distribution of strains in folds. Faults; classification, causes and dynamics of faulting, strike-slip, normal and reverse faults, thrust and nappe.
- Shear zones, joints, cleavages, lineations: their types, classification, genesis and significance. Unconformity: types and geological significance.
- Dynamic evolution of continental and oceanic crust, Tectonics of Precambrian Orogenic Belts of India. Formation of mountain roots. Anatomy of orogenic belts. Origin of the Alpine - Himalayan belt, the Appalachian- Caledonian belt, the Andes, the North American Cordillera.
- Principles of Remote Sensing; general idea about electromagnetic spectrum, aerial photographs and their geometry, application of Photogrammetry. Satellite image characters and image analysis. Identification of ground objects based on tone, texture and pattern; principles of terrain analysis, ground water potential, rock type identification; and interpretation of topographic and tectonic features.

(ii) Mineralogy, Geochemistry and Petrology

- Crystals: their symmetry elements and classification. Concept of space lattice.Properties of light, Optical properties of minerals; Orthoscopic and Conoscopic properties. Silicate structures and classification of minerals. Mode of occurrence, chemical, physical, optical properties and genesis of Silica, Feldspar, Feldspathoid, Amphibole, Pyroxene, Mica and Olivine group.
- Geochemical classification of elements. Abundance of elements in the Earth. Trace and Rare Earth Elements: their significance in geological processes.Graphical presentation and interpretation of geochemical data. Stable isotopes and their geological significance. Radioactive dating based on U-Pb, Sm-Nd, Rb-Sr, Ar-Ar decay schemes and concept of "C dating.
- Origin of magma and its emplacement. Magma evolution and controlling factors. Mode of occurrence, texture and classification (mineralogical and chemical) of igneous rocks. Phase Rule and its application in binary (AlbiteAnorthite, Diopside-Anorthite, Albite-Orthoclase. Forsterite-Silica and Leucite-Silica) and ternary (Diopside- Albite- Anorthite and Nepheline - Kaliophyllite Silica) magmatic systems. Mode of occurrence, classification and petrogenesis of mafic-ultramafic, granitic and alkaline rocks.
- Metamorphism: its types and factors. Texture, structure and classification of metamorphic rocks. Concept of metamorphic grade, zones and facies. Paired metamorphic belts and ocean floor and burial metamorphism. Study of low grade, medium-grade and high-grade metamorphic rocks. Metamorphic reactions and pressure-temperature conditions of metamorphism. Metamorphic differentiation, Anatexis and origin of migmatites. Petrogenesis of hornfelsic and cataclastic rocks, schist, gneiss, amphibolites, granulite and eclogite. Sedimentary rocks; their classification, texture and structure. Concept of diagenesis and lithification. Petrology of sand, shale, carbonate, chemical and biochemical sedimentary rocks. Sedimentary environments and facies (continental alluvial-fluvial, lacustrine, desert-aeolion, glacial, marine and continental). Palaeocurrent, palaeoenvironmental, and basin analysis. Evolution of sedimentary basins, tectonics and sedimentation.

(iii) Stratigraphy and Palaeontology.

- Geological Time-scale, reasoning and equivalence of its divisions. International code of stratigraphic nomenclature. Principles and methods of stratigraphic correlation. Geochronology and Chronostratigraphy. Lithostratigraphy. Biostratigraphy. Quantitative stratigraphy.Magnetostratigraphy,Cyclostratigraphy, Pedostratigraphy, Seismic stratigraphy and Sequence stratigraphy.
- Distribution, classification, lithology, structure and economic importance of Dharwar, Bastar, Singhbhum, Aravalli - Bundelkhand and Shillongcratons with special emphasis on

Aravalli, Dharwar, Sausar - Sakoli, Delhi,. Vindhyan, Cuddapah and Malaniterranes.

- Overview of Phanerozoic stratigraphy of India with special reference to Palaeozoic rocks of Kashmir, Mesozoic rocks of Spiti, Kachchh, western Rajasthan, central and southern India. GondwanaSupergroup and its significance. Tertiary rocks of western India and Himalayan region including SiwafikSupergroup.
- Deccan Volcanic Province, its evolutions, extent, stratigraphy and age. K-T boundary and mass extinction. Overview of Quaternary geology of India with emphasis on the origin and evolution of Indo-Gangetic plains and Thar Desert.
- Origin of life and Organic Evolution, concept of palaeoecology. Marine and terrestrial ecosystems. Mass extinctions.
- Morphology, classification, palacoccology and evolutionary trends of Corals, Echinoids, Lamellibranchs, Cephalopods, Gastropods, Brachiopods; Trilobites and Graptoloids.
- Morphology, classification, palaeoecology and evolutionary trends of Foraminifers. Ostracods. Conodonts and Nanoplanktons. Vertebrates of Siwalik. Evolutionary histories of Man, Elephant and Horse. Gondwana flora and its significance. Palynology and its applications.

(iv) Mineral and Energy Resources

- Principle ore mineral groups. Classification of ore forming processes. Mineral Resource and concept of ore genesis. Characteristics of Hydrothermal processes and deposits. Metasomatic replacement type of deposits. Magmatism and ore genesis. Economic mineral deposits of sedimentary association including iron, manganese and evaporate deposits. Residual concentration process and ore deposits. Mechanical concentration: Fluvial, Alluvial, Aeolian and Beach placers. Oxidation and Supergene Sulphide deposits. Economic deposits of Biogenic origin. Contemporary Ore forming systems: black smokers, Mn nodules.
- Geological setting and genesis of important metallic (iron, manganese, chromium, lead, zinc, copper and aluminum), industrial (mica, feldspar, quartz, soapstone, clay, gypsum, limestone, calcite, wollastonite and abrasive), rock phosphate, and soda - potash deposits of India with special reference to Rajasthan.
- Coal: Its classification and origin. Coal-bed methane and fundamentals of its exploration. Geological and geographical distribution of coal deposits in India. Lignite deposits of India: their geological setting, characteristics and origin. Oil and gas deposits: their origin, nature and migration (primary and secondary), characteristics of reservoir rocks and traps (structural, stratigraphic and combination). Geology of Cambay Basin, Barmer - Jaisalmer Basin, Bombay High, Assam and Krishna - Godavari oil fields of India.

- Mode of occurrence, geological setting and genesis of U and Th deposits of India. Geological, geochemical and geophysical exploration methods for ferrous, non ferrous metals and petroleum and coal deposits.

(v) Hydrogeology, Environmental and Engineering Geology

- Ground water: its occurrence and distribution; water table and its significance. Types of aquifer, geological formations as aquifers and their properties: porosity. permeability, specific yield, specific retention, hydraulic conductivity, transmissivity, storage coefficient. Steady, unsteady and radial flow conditions of water, Darcy's law and its application. Water table contour maps. Pumping test and its significance. Physical and chemical properties of water, quality criteria for various uses, Groundwater pollution (natural and anthropogenic), problems of nitrate, arsenic and fluoride in water and remedial measures. Salt water intrusion in coastal aquifers and its prevention. Surface and subsurface geological and geophysical methods of groundwater exploration, hydrogeomorphic mapping using various remote sensing techniques. Isotopes in hydrogeological studies. Groundwater provinces of India with special reference to groundwater resources of Rajasthan
- Water resources evaluation and management. Impact of industrialization and urbanization on surface and ground water quality. Water logging problems; causes and remedies.
- Basic principles of Environmental Geology. Elementary idea about climate change through Earth's history. Cenozoic climate extremes - impact on human evolution. Ozone layer depletion, Carbon di-oxide in the atmosphere and sea water. Records of palaeotemperatures in ice cores. Greenhouse gases and global warming Eco-friendly mining and concept of sustainable development. Environmental impact of mining, EIA (Environmental Impact Assessment) and EMP (Environmental Management Plan)
- Engineering properties of rocks. Physical characteristics of building stones. Metal and concrete aggregates. Geological investigations for dams and reservoir sites. Dam foundation investigations, problems and remedies. Geotechnical considerations for tunnel construction and tunnel alignments; classification of ground for tunneling purposes; types of tunnel support. Mass movements with special emphasis on landslides. Hill slope instability. Seismic zones of India. Aseismic design of buildings. Influence of geological factors on foundation and design of buildings. Influence of Neotectonics in seismic hazard assessment.

4. Economics:

Microeconomics

- Consumer Behaviour Demand theory: Bandwagon, Snob and Veblen effect. Indifference curve Analysis, income and substitution effects, Slutsky theorem, ordinary and compensated demand curves, Elasticity of demand. Nature of utility. functions, Analysis of consumer behavior under risk and uncertainty, Asymmetric information, Behavioral Economics.
- Short run and long run production functions, Cost functions and Curves. Elasticity of substitution. Euler's theorem. Production function-Cobb Douglas and CES. Technical progress. Economies of Scope and Learning curve analysis.
- Determination of price and output under different market structures. Factor pricing Analysis. Game theory: Cooperative and non-cooperative games, Sequential games, Dominant strategy and Nash Equilibrium. Welfare economics Pareto optimality, Market failure and externalities, New welfare economics, Social Welfare Function, First and Second Theorem of Welfare economics, Theory of second best. Arrow's Impossibility Theorem.

Macroeocnomics

- National income- concepts and measurement, flaws in conventional system of National Income Accounts, Green Accounting, Consumption hypotheses absolute, relative, life-cycle and permanent income hypotheses Classical, Keynesian and Post-Keynesian theories of determination of income and output. Philips curve Controversy. Post Keynesian Theories of demand for Money: Baumol, Tobin, Friedman, Patinkin and Real balance effect. Investment function: Neoclassical theory. Accelerator theory, Tobin's Q theory.
- The components of money supply RBI approach to money supply. High powered money. The IS-LM model, the relative effectiveness of monetary and fiscal policies. RicardianEquivalence.Natural Rate of Unemployment-Adaptive Expectation. Trade Cycle Theories: Accelerator - Multiplier Interaction model, Kaldor model. Mundell - Fleming model. Monetarism: Monetarist-Fiscalist debate on Policy Activism. New classical approach to macro economics. Real Business Cycles, New Keynesian Macroeconomics- Sticky Price (Menu Cost) Model, Efficiency Wage Hypothesis.

Economic Growth and Development

- Economic development and growth. Measurement and indicators of development: PQLI, HDI, HPI and GDI. Entitlement and capability approach. Sustainable Development. Growth-Distribution Trade-offs. Measurement of inequality- Lorenz curve and Gini Coefficient. Development and Growth models: Lewis. Fei Ranis, Harrod-Domar, Solow, Kaldor Endogenous Growth, Uzawa-Lucas Model. Golden

Rule of Capital Accumulation. Technological progress- Embodied and disembodied, Technical progress- Hicks and Harrod, Learning by doing. Cambridge criticism of Neo-classical Analysis of Growth.Economic function of market and state: Market failure and government failure. Project evaluation and Cost- benefits analysis. Theory of Environment Regulation: Political Economy Model of Regulation, Pigovian taxes; Subsidies for Abatement of pollution, Property Rights and the Coasian Approach: bargain Solution. Quantitative regulation: Command and Control Standard setting; Tradable pollution permits. Methods of environment valuation: Hedonic pricing, Contingent valuation and Travel cost method.

Annexure-2

Part B--General Knowledge, English, Punjabi, Logical Reasoning and Mental Ability.

Sr. No.	***Indicative Contents of Syllabus***	***Weightage (Approx.)***
1	***General Knowledge and Current affairs of National and International importance including:*** *(i) Political issues,* *(ii) Environment issues,* *(iii) Current Affairs,* *(iv) Science and Technology,* *(v) Economic issues,* *(vi) History of India with special reference to Indian freedom struggle movement.* *(vii) Sports,* *(viii) Cinema and Literature.*	*10*
2	***Logical Reasoning & Mental Ability:*** *Verbal reasoning : Coding, Decoding, Analogy, Classification, Series, Direction sense test, relations, mathematical operations, time test, odd man out problems.* *Non Verbal reasoning : Series, Analogy and Classification.* *Basic numerical skills, Percentage, Number system, LCM and HCF, Ratio and Proportion, Number series, Average, Problems based on Ages, Profit & Loss, Partnership and Mixture, Simple and Compound Interest, Work and Time, Time and Distance. Mensuration and Data Interpretation.*	*10*
3	***English:-*** *Basic Grammar, Subject and Verb, Adjectives and Adverbs, Synonyms, Antonyms, One Word Substitution, Fill in the Blanks, Correction in Sentences, Idioms and their meanings, Spell Checks, Adjectives, Articles, Prepositions, Direct and Indirect Speech, Active and Passive Voice, Correction in Sentences, etc.*	*5*
4	**Punjabi**	*5*

	ਸ਼ੁੱਧ-ਅਸ਼ੁੱਧ, ਸ਼ਬਦਜੋੜ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ, ਸਮਾਨਾਰਥਕ/ਵਿਰੋਧੀ ਸ਼ਬਦ, ਨਾਂਵ, ਪੜਨਾਂਵ ਅਤੇ ਕਿਰਿਆ ਦੀਆਂ ਕਿਸਮਾਂ ਤੇ ਸਹੀ ਵਰਤੋਂ, ਲਿੰਗ ਅਤੇ ਵਚਨ, ਪੰਜਾਬੀ ਅਖਾਣ ਤੇ ਮੁਹਾਵਰੇ, ਅੰਗਰੇਜੀ ਤੋਂ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਅਤੇ ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਦੀ ਥਾਂ ਇੱਕ ਸ਼ਬਦ ਆਦਿ।	
	Maximum Marks	*30*

Note:-a) The distribution of marks/question in each section is indicative. It may vary slightly.

b) The syllabus is broadly classified as above but may vary to some extent.