SCHEME OF EXAMINATION DEPUTY DIRECTOR (CAPACITY BUILDING CELL)

The followings shall be the Scheme of Examination, components of Written Test:

A. Paper – I (MCQ Type) :

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	Marks
(i)	Reasoning Ability	10	10
(ii)	General Awareness	20	20
(iii)	Test of Language : English or Hindi	20	20
(iv)	Quantitative Aptitude	10	10
	Total	**60**	**60**

Syllabus :

i. **Reasoning Ability :** Number Ranking, Arithmetical Reasoning, Decision Making, Cubes and Dice, Analogy, Mirror Images, Alphabet Series, Number Series, Coding-Decoding, Non-Verbal Series, Statements & Arguments, Clocks & Calendars, Embedded Figures, Syllogism, Data Interpretation, Blood Relations, Directions, Statements & Conclusions

ii. **General Awareness :** Geography, Literature, Famous Places in India, Tourism, Current Affairs, Inventions and Discoveries, Indian Economy, Famous Books & Authors, Heritage, Indian History Artists, Countries and Capitals, Civics, Environmental Issues, Sports, Indian Politics, Famous Days & Dates, Indian Parliament, Rivers, Lakes and, Seas, Biology, and General Science.

iii. **Test of English or Hindi :** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

iv. **Quantitative Aptitude :** HCF & LCM, Average, Percentage, Profit and Loss, Number System & Simplification, Simple & Compound interest, Ratio and Proportion & Partnership, Speed, Time & Distance (Train, Boats & Stream), Number Series and Number System.

B. Paper – II (MCQ Type):

Paper – II (MCQ Type)	Test Components	Duration : 2 Hours	
		No. of Questions	Marks
(v)	Educational Planning and Administration	120	120
	Total	**120**	**120**

Educational Planning and Administration :

(a) Curriculum Studies
- Principles & Strategies of curriculum development
- Models of Curriculum Design
- Curriculum Change
- Foundations of Curriculum Planning

(b) Educational Research
- Aims, approaches and Designs
- Meaning of Concepts, Constructs and Variables
- Types of Measurement Scale

(c) Psychological Foundations of Education
- Psychological Foundations of Education
- Education and School of Psychology
- Learning and Motivation
- Intelligence and Creativity
- Personality and Adjustment Mechanism

(d) Training Skills
- Assessment of Training needs
- Career Growth
- Skill Gap analysis
- Instructional design methods
- Use of technology in education
- Academic writing tools and techniques

(e) Educational Technology
- Concept of Educational Technology
- Models of Development of Instructional Design
- Emerging Trends in e learning
- Use of ICT in Evaluation, Administration and Research

(f) Contemporary issues in Education in India
- Regulations and Acts in Education
- Committees and Commissions
- National Educational Policies and NCFs
- Global Trends/Practices in Education
- Role of Autonomous bodies and recent Schemes /programme in Education

(g) Assessment and Evaluation
- Test, Measurement, Assessment and Evaluation
- Types of Achievement Test
- Models of Educational Evaluation and Assessment

(h) Inclusive Education
- Evolution of the Philosophy of Inclusive Education
- Concept of Impairment, Disability and Handicap
- Planning and Management of Inclusive Classrooms
- Barriers and Facilitators in Inclusive Education

SCHEME OF EXAMINATION DEPUTY DIRECTOR (ACADEMIC)

The followings shall be the Scheme of Examination, components of Written Test:

A.   Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	Marks
(i)	Reasoning Ability	10	10
(ii)	General Awareness	20	20
(iii)	Test of Language : English or Hindi	20	20
(iv)	Quantitative Aptitude	10	10
	Total	**60**	**60**

Syllabus:

i.   **Reasoning Ability :** Number Ranking, Arithmetical Reasoning, Decision Making, Cubes and Dice, Analogy, Mirror Images, Alphabet Series, Number Series, Coding-Decoding, Non-Verbal Series, Statements & Arguments, Clocks & Calendars, Embedded Figures, Syllogism, Data Interpretation, Blood Relations, Directions, Statements & Conclusions

ii. **General Awareness :** Geography, Literature, Famous Places in India, Tourism, Current Affairs, Inventions and Discoveries, Indian Economy, Famous Books & Authors, Heritage, Indian History Artists, Countries and Capitals, Civics, Environmental Issues, Sports, Indian Politics, Famous Days & Dates, Indian Parliament, Rivers, Lakes and, Seas, Biology, and General Science.

iii. **Test of English or Hindi :** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

iv. **Quantitative Aptitude:** HCF & LCM, Average, Percentage, Profit and Loss, Number System & Simplification, Simple & Compound interest, Ratio and Proportion & Partnership, Speed, Time & Distance (Train, Boats & Stream), Number Series and Number System.

B. Paper – II (MCQ Type):

Paper – II (MCQ Type)	Test Components	Duration : 2 Hours	
		No. of Questions	Marks
(v)	Educational Planning and Administration	120	120
	Total	120	120

Educational Planning and Administration :

(c) Curriculum Studies
- Principles & Strategies of curriculum development
- Models of Curriculum Design
- Curriculum Change
- Foundations of Curriculum Planning

(d) Educational Research
- Aims, approaches and Designs
- Meaning of Concepts, Constructs and Variables
- Types of Measurement Scale

(c) Psychological Foundations of Education
- Psychological Foundations of Education
- Education and School of Psychology
- Learning and Motivation
- Intelligence and Creativity
- Personality and Adjustment Mechanism

(d) Philosophical Foundations of Education
- Western Schools of Philosophy
- Indian Schools of Philosophy
- Contribution of Western Thinkers to Educational Theories
- Contribution of Indian Thinkers to Educational Theories and Practice

(e) Educational Technology
- Concept of Educational Technology
- Models of Development of Instructional Design
- Emerging Trends in e learning
- Use of ICT in Evaluation, Administration and Research

(f) Contemporary issues in Education in India
- Regulations and Acts in Education
- Committees and Commissions
- National Educational Policies and NCFs
- Global Trends/Practices in Education
- Role of Autonomous bodies and recent Schemes /programme in Education

(g) Assessment and Evaluation
- Test, Measurement, Assessment and Evaluation
- Types of Achievement Test
- Models of Educational Evaluation and Assessment

(h) Inclusive Education
- Evolution of the Philosophy of Inclusive Education
- Concept of Impairment, Disability and Handicap
- Planning and Management of Inclusive Classrooms
- Barriers and Facilitators in Inclusive Education.

SCHEME OF EXAMINATION ASSISTANT DIRECTOR (ADMINISTRATION)

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II) :

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	Marks
(i)	General Awareness	15	15
(ii)	Reasoning Ability	15	15
(iii)	Mathematical Ability	10	10
(iv)	Test of Language : English Or Hindi	10	10
(v)	ICT Awareness	10	10
	Total	60	60

Syllabus:

(i) **General Awareness** : Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) **Reasoning Ability :** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) **Mathematical Ability** : The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) **Test of English or Hindi :** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) **ICT Awareness :** The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B. Paper –II (MCQ) :

Duration : 2 Hours		Questions : 120	Marks : 120
S.No.	Name of Post	Syllabus	
1.	Assistant Director (Administration)	1. **Establishment/Financial Matters:** Advances, Children Education Allowance, Compensatory Allowances, CCS (Conduct) Rules, Departmental Promotion Committee, MACP, Deputation and Foreign Service, CCS(CCA)-Rules, House Allotment Rules, Income Tax, Joining Time, Leave Rules, Leave Travel Concession (LTC), CGHS, Medical Attendance Rules (CSMA Rules), Pay & Allowances, Pay Fixation, Provident Fund, Pension Rules, Reservations and Concession in appointments, Resignation, Removal and Dismissal, Retirement on Superannuation, Seniority and Promotion, Travelling Allowance, National Pension System and other Establishment matters. General Financial Rules-2017, Procurement of Goods and Services, works, PFMS, CAN Account, Treasury Single Account (TSA) **(120 Questions)**	

SCHEME OF EXAMINATION ACADEMIC OFFICER (TECHNOLOGY)

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 hour	
		No. of Questions	Marks
(i)	General Awareness	20	20
(ii)	Reasoning & Numerical Aptitude	20	20
(iii)	Test of English or Hindi	10	10
(iv)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

i. **General Awareness**: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

ii. **Reasoning & Numerical Aptitude:** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

iii. **Test of English or Hindi:** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

iv. **ICT Awareness:** The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B. Paper –II (MCQ) Academic Officer (Technology) :

Duration : 2 Hours	Questions : 120	Marks : 120
S.No.	Name of Post	ACADEMIC OFFICER (TECHNOLOGY)
		Syllabus
1.		**CHEMICAL SCIENCES**

Inorganic Chemistry
1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
3. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
5. Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
7. Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical methods.
10. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron- transfer reactions; nitrogen fixation, metal complexes in medicine.
11. Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.
12. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Physical Chemistry:
1. Basic principles of quantum mechanics: Postulates; operator algebra; exactly-solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.
2. Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.
3. Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle.
4. Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π-electron systems.
5. Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.
6. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.
7. Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.
8. Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases;

partition functions and their relation to thermodynamic quantities – calculationsfor model systems.

9. Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye- Huckel theory; electrolytic conductance – Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.

10. Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.

11. Colloids and surfaces: Stability and properties of colloids; isotherms and surfacearea; heterogeneous catalysis.

12. Solid state: Crystal structures; Bragg's law and applications; band structure of solids.

13. Polymer chemistry: Molar masses; kinetics of polymerization.

14. Data analysis: Mean and standard deviation; absolute and relative errors; linearregression; covariance and correlation coefficient.

Organic Chemistry

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.

2. Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.

3. Aromaticity: Benzenoid and non-benzenoid compounds – generation and reactions.

4. Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.

5. Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.

6. Common named reactions and rearrangements – applications in organic synthesis.

7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.

8. Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear andconvergent synthesis, umpolung of reactivity and protecting groups.

9. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.

10. Pericyclic reactions – electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applicationsof photochemical reactions in organic chemistry.

11. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).

12. Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.

13. Structure determination of organic compounds by IR, UV-Vis, ^1H & ^{13}C NMR and Mass spectroscopic techniques.

Interdisciplinary topics

1. Chemistry in nanoscience and technology.
2. Catalysis and green chemistry.
3. Medicinal chemistry.

4. Supramolecular chemistry.
5. Environmental chemistry.

Common Syllabus for Part 'B' and 'C'Mathematical Sciences

UNIT – 1

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, Lebesgue measure,Lebesgue integral.

Functions of several variables, directional derivative, partial derivative, derivative as a lineartransformation, inverse and implicit function theorems.

Metric spaces, compactness, connectedness. Normed linear Spaces. Spaces of continuous functionsas examples.

Linear Algebra: Vector spaces, subspaces, linear dependence, basis, dimension, algebra of lineartransformations.

Algebra of matrices, rank and determinant of matrices, linear equations.Eigenvalues and eigenvectors, Cayley-Hamilton theorem.

Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms,triangular forms, Jordan forms.

Inner product spaces, orthonormal basis.

Quadratic forms, reduction and classification of quadratic forms

UNIT – 2

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, Maximummodulus principle, Schwarz lemma, Open mapping theorem.

Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations.

Algebra: Permutations, combinations, pigeon-hole principle, inclusion-exclusion principle,derangements.

Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese Remainder Theorem,Euler's Ø- function, primitive roots.

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

Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal idealdomain, Euclidean domain.

Polynomial rings and irreducibility criteria.

Fields, finite fields, field extensions, Galois Theory.

Topology: basis, dense sets, subspace and product topology, separation axioms, connectedness andcompactness.

UNIT – 3

Ordinary Differential Equations (ODEs):

Existence and uniqueness of solutions of initial value problems for first order ordinary differentialequations, singular solutions of first order ODEs, system of first order ODEs.

General theory of homogenous and non-homogeneous linear ODEs, variation of parameters,Sturm-Liouville boundary value problem, Green's function.

Partial Differential Equations (PDEs):

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs.

Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.

Numerical Analysis :

Numerical solutions of algebraic equations, Method of iteration and Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolation, Numerical differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

Calculus of Variations:

Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema. Variational methods for boundary value problems in ordinary and partial differential equations.

Linear Integral Equations:

Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels. Characteristic numbers and eigenfunctions, resolvent kernel.

Classical Mechanics:

Generalized coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's principle and principle of least action, Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

UNIT – 4

Descriptive statistics, exploratory data analysis

Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions (univariate and multivariate); expectation and moments. Independent random variables, marginal and conditional distributions. Characteristic functions. Probability inequalities (Tchebyshef, Markov, Jensen). Modes of convergence, weak and strong laws of large numbers, Central Limit theorems (i.i.d. case).

Markov chains with finite and countable state space, classification of states, limiting behaviour of n-step transition probabilities, stationary distribution, Poisson and birth-and-death processes.

Standard discrete and continuous univariate distributions. sampling distributions, standard errors and asymptotic distributions, distribution of order statistics and range.

Methods of estimation, properties of estimators, confidence intervals. Tests of hypotheses: most powerful and uniformly most powerful tests, likelihood ratio tests. Analysis of discrete data and chi-square test of goodness of fit. Large sample tests.

Simple nonparametric tests for one and two sample problems, rank correlation and test for independence. Elementary Bayesian inference.

Gauss-Markov models, estimability of parameters, best linear unbiased estimators, confidence intervals, tests for linear hypotheses. Analysis of variance and covariance. Fixed, random and mixed effects models. Simple and multiple linear regression. Elementary regression diagnostics. Logistic regression.

Multivariate normal distribution, Wishart distribution and their properties. Distribution of quadratic forms. Inference for parameters, partial and multiple correlation coefficients and related tests. Data reduction techniques: Principle component analysis, Discriminant analysis, Cluster analysis, Canonical correlation.

Simple random sampling, stratified sampling and systematic sampling. Probability proportional to size sampling. Ratio and regression methods.

Completely randomized designs, randomized block designs and Latin-square designs. Connectedness and orthogonality of block designs, BIBD. 2K factorial

experiments: confounding and construction.

Hazard function and failure rates, censoring and life testing, series and parallel systems.

Linear programming problem, simplex methods, duality. Elementary queuing and inventory models. Steady-state solutions of Markovian queuing models: M/M/1, M/M/1 with limited waiting space, M/M/C, M/M/C with limited waiting space, M/G/1.

PHYSICAL SCIENCES
PART 'A' CORE

I. Mathematical Methods of Physics

Dimensional analysis. Vector algebra and vector calculus. Linear algebra, matrices, Cayley-Hamilton Theorem. Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel, Laguerre and Legendre functions). Fourier series, Fourier and Laplace transforms. Elements of complex analysis, analytic functions; Taylor & Laurent series; poles, residues and evaluation of integrals. Elementary probability theory, random variables, binomial, Poisson and normal distributions. Central limit theorem.

II. Classical Mechanics

Newton's laws. Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions - scattering in laboratory and Centre of mass frames. Rigid body dynamics- moment of inertia tensor. Non-inertial frames and pseudoforces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws and cyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity- Lorentz transformations, relativistic kinematics and mass–energy equivalence.

III. Electromagnetic Theory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell'sequations in free space and linear isotropic media; boundary conditions on the fields at interfaces. Scalar and vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields.

IV. Quantum Mechanics

Wave-particle duality. Schrödinger equation (time-dependent and time-independent). Eigenvalue problems (particle in a box, harmonic oscillator, etc.). Tunneling through a barrier. Wave-function in coordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac notation for state vectors. Motion in a central potential: orbital angular momentum, angular momentum algebra, spin, addition of angular momenta; Hydrogen atom. Stern-Gerlach experiment. Time- independent perturbation theory and applications. Variational method. Time dependent perturbation theory and Fermi's golden rule, selection rules. Identical particles, Pauli exclusion principle, spin-statistics connection.

V. Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro-and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Blackbody radiation and Planck's distribution law.

VI. Electronics and Experimental Methods

Semiconductor devices (diodes, junctions, transistors, field effect devices,

homo- and hetero-junction devices), device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications. Digital techniques and applications (registers, counters, comparators and similar circuits). A/D and D/A converters. Microprocessor and microcontroller basics.

Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting,

PART 'B' ADVANCED

I. Mathematical Methods of Physics

Green's function. Partial differential equations (Laplace, wave and heat equations in two and threedimensions). Elements of computational techniques: root of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, Solution of first order differential equation using Runge- Kutta method. Finite difference methods. Tensors. Introductory group theory: SU(2), O(3).

II. Classical Mechanics

Dynamical systems, Phase space dynamics, stability analysis. Poisson brackets and canonical transformations. Symmetry, invariance and Noether's theorem. Hamilton-Jacobi theory.

III. Electromagnetic Theory

Dispersion relations in plasma. Lorentz invariance of Maxwell's equation. Transmission lines and wave guides. Radiation- from moving charges and dipoles and retarded potentials.

IV. Quantum Mechanics

Spin-orbit coupling, fine structure. WKB approximation. Elementary theory of scattering: phase shifts, partial waves, Born approximation. Relativistic quantum mechanics: Klein-Gordon and Dirac equations. Semi-classical theory of radiation.

V. Thermodynamic and Statistical Physics

First- and second-order phase transitions. Diamagnetism, paramagnetism, and ferromagnetism. Ising model. Bose-Einstein condensation. Diffusion equation. Random walk and Brownian motion. Introduction to nonequilibrium processes.

VI. Electronics and Experimental Methods

Linear and nonlinear curve fitting, chi-square test. Transducers (temperature, pressure/vacuum, magnetic fields, vibration, optical, and particle detectors). Measurement and control. Signal conditioning and recovery. Impedance matching, amplification (Op-amp based, instrumentation amp, feedback), filtering and noise reduction, shielding and grounding. Fourier transforms, lock-in detector, box-car integrator, modulation techniques.

High frequency devices (including generators and detectors).

VII. Atomic & Molecular Physics

Quantum states of an electron in an atom. Electron spin. Spectrum of helium and alkali atom. Relativistic corrections for energy levels of hydrogen atom, hyperfine structure and isotopic shift, width of spectrum lines, LS & JJ couplings. Zeeman, Paschen-Bach & Stark effects. Electron spin resonance. Nuclear magnetic resonance, chemical shift. Frank-Condon principle. Born-Oppenheimer approximation. Electronic, rotational, vibrational and Raman spectra of diatomic molecules, selection rules. Lasers: spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, population inversion, rate equation. Modes of resonators and coherence length.

VIII. Condensed Matter Physics

Bravais lattices. Reciprocal lattice. Diffraction and the structure factor. Bonding of solids. Elastic properties, phonons, lattice specific heat. Free electron theory and electronic specific heat. Response and relaxation phenomena. Drude model of electrical and thermal conductivity. Hall effect

and thermoelectric power. Electron motion in a periodic potential, band theory of solids: metals, insulators and semiconductors. Superconductivity: type-I and type-II superconductors. Josephson junctions. Superfluidity. Defects and dislocations. Ordered phases of matter: translational and orientational order, kinds of liquid crystalline order. Quasi crystals.

IX. Nuclear and Particle Physics

Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semi- empirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge-symmetry of nuclear forces. Deuteron problem. Evidence of shell structure, single-particle shell model, its validity and limitations. Rotational spectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. Fission and fusion. Nuclear reactions, reaction mechanism, compound nuclei and direct reactions.

Classification of fundamental forces. Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.). Gellmann-Nishijima formula. Quark model, baryons and mesons. C, P, and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction. Relativistic kinematics.

(120 Questions)

SCHEME OF EXAMINATION ACADEMIC OFFICER (PARAMEDICAL COURSES)

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 hour	
		No. of Questions	Marks
(i)	General Awareness	20	20
(ii)	Reasoning & Numerical Aptitude	20	20
(iii)	Test of English or Hindi	10	10
(iv)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

i. **General Awareness**: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

ii. **Reasoning & Numerical Aptitude:** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

iii. **Test of English or Hindi:** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

iv. **ICT Awareness:** The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B. **Paper –II (MCQ) Academic Officer (Paramedical Courses) :**

Duration : 2 Hours		Questions : 120	Marks : 120
S.No.	Name of Post	ACADEMIC OFFICER (PARAMEDICAL COURSES)	
		Syllabus	
1.	**Anatomy** Introduction to Anatomy, Introduction to Anatomical terms, Organization of the human body: The Skeletal System, The Muscular System, The Nervous System, The Sensory Organs, Circulatory and lymphatic system, The Respiratory System, The Digestive system, The Excretory System (Urinary), The Endocrine system, The Reproductive system including breast, The Integumentary system.		
	Physiology Cell Physiology, Skeletal System, Muscular System, Control System - Nervous System, The Endocrine System, Blood & Circulatory System, The Respiratory System, The Digestive System, The Excretory System, The Sensory Organs, The Reproductive System, Defense: Neural, Lymphatic and Immunological.		
	Biochemistry Introduction Structure and functions of Cell membrane, Composition and metabolism of carbohydrates, Composition and metabolism of Lipids, Composition and metabolism of Amino acids and proteins Composition of Vitamins and Minerals, Immunochemistry.		
	Microbiology Introduction & Historical background, Definitions-Medical Microbiology, which includes the branches, Bacteriology, Virology, Mycology, Parasitology and Immunology. Infection, Pathogen, Commensal, Symbiosis, Host, Vector, Contagious Disease, Infectious disease, Epidemic, Endemic, Pandemic & Zoonosis, Flora of the human body.		
	Source, Mode of infection, route of infection and spread, Endogenous and exogenous infection, reservoir of infection Infection Control, Sterilization and Disinfection, Chemotherapy, Waste Disposal, General characteristics of Bacteria, Morphology of Bacteria, Physiology of Bacteria, Identification of Bacteria, Bacterial Genetics, Normal Flora, Systemic Bacteriology, Parasitology, Mycology, Virology, Immunology, Applied Microbiology.		
	Pathology Introduction, Cellular growth, Neoplasms, Special pathology - Respiratory tract, Cardio-vascular system, Blood Disorders, Gastro Intestinal Tract, Liver, Gall bladder & pancreas, Kidneys & Urinary tract, Male genital systems, Female genital system, Cancer Breast , Central Nervous system, Metastatic tumour, Skeletal system.		
	Clinical pathology - Various blood and bone marrow tests in assessment and monitoring of disease conditions Examination of body cavity fluids, transudates and exudates Urine and faeces.		
	Nutrition Introduction to Food & Nutrition, Carbohydrates, Fats, Proteins, Vitamins, Minerals Water & Electrolytes, Cookery rules & preservation of nutrients, Normal Nutrition/Balanced diet Therapeutic Nutrition Biochemistry: Introduction Structure and functions of Cell membrane Composition and metabolism of carbohydrates Composition and metabolism of Lipids Composition and metabolism of Amino acids and proteins Composition of Vitamins and Minerals Immunochemistry.		
	Pharmacology Introduction to pharmacology, Chemotherapy, Pharmacology of common used antiseptics, disinfectant and insecticides, Drugs acing on G.I system, Drugs used on respiratory systems, Drugs used on urinary system, Miscellaneous Drugs used on skin and mucous membranes, Drugs acting on nervous system, Cardiovascular drugs, Drugs used for hormonal, disorders and supplementation, contraception and medical termination of pregnancy, Introduction to drugs used		

in alternative systems of medicine.

Community Health

Introduction, Determinants of health, Epidemiology- Rates & Ratios, Association & Causation, Immunity & Immunizing agents, Epidemiology of common Communicable disease - Respiratory infections, Intestinal Infections, Arthropod infections, Viral, Bacterial, Riskettsial diseases, Parasitic zoonoses, Surface infection. Epidemiology of Noncommunicable diseases, Screening for Disease – Uses, Criteria, Sensitivity & Specificity, problems of borderline, Demography, Population and its control, Health Planning and Policies and problems Delivery of community health services, National health and family welfare programmes.

Vital Signs

Introduction, Body temperature, Pulse, Respiration, Blood pressure, Recording of vital signs, Health Assessment Machinery, Equipment.

Psychology

Introduction, Biology of behavior, Cognitive Processes Motivation and Emotional processes, Personality, Psychological assessment & tests, Psychological assessment & tests, Mental hygiene and mental Health.

Sociology

Introduction, Individual & society, Culture, Social groups and processes, Population Family and marriage, Social stratification, Types of communities in India - (Rural, urban and regional). Social change, Social organization and social system, Social control, Social problems.

Genetics

Introduction Maternal, prenatal and genetics Genetic testing in the neonates and children Genetic conditions of adolescents and adults Services related to Genetics

Communication & Educational Technology

Review of communication, Process, Interpersonal relations, Human relations, Guidance & counseling, Principles & philosophies of Education Teaching, Learning Process, Methods of teaching Educational media, Assessment Information, Education & communication for health (IEC).

Research

Research and research process, Research problem/ question, Review of literature, Research approaches and designs, Population, Sample and Sampling, Data collection methods and tools, Analysis of data, Communication and utilization of research.

Statistics

Introduction to statistics, Definition, use of statistics, scales of measurement, Frequency of distribution and graphical presentation of data Measures of central tendency - Mean, median, mode, Measures of Variability: Standard deviation, Coefficient of correlation, Normal probability. Tests of significance - t' test, chi square, Statistical packages and its application – SPSS.

First Aid & Emergency

Definition of First Aid, First Aid kit, Articles and purposes, Bandages-Materials, techniques, Different types of knots and slings, Emergency care in – Wound, Haemorrhage, Shock, Burns & Scalds, Unconscious, Epilepsy, Drowning, Strangulation, Poisoning & insect bites, Respiratory & Cardiac arrest, Injuries to bones, muscles & joints, Transportation of injured persons, Triage.

(120 Questions)

SCHEME OF EXAMINATION ACADEMIC OFFICER (TEACHER EDUCATION)

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 hour	
		No. of Questions	**Marks**
(i)	General Awareness	20	20
(ii)	Reasoning & Numerical Aptitude	20	20
(iii)	Test of English or Hindi	10	10
(iv)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

i. **General Awareness**: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

ii. **Reasoning & Numerical Aptitude:** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

iii. **Test of English or Hindi:** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

iv. **ICT Awareness:** The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B.   Paper –II (MCQ) Academic Officer (Teacher Education) :

Duration : 2 Hours		Questions : 120	Marks : 120
S.No.	Name of Post	ACADEMIC OFFICER (TEACHER EDUCATION)	
	Syllabus		

1.	a) Curriculum Studies
	   • Principles & Strategies of curriculum development
	   • Models of Curriculum Design
	   • Curriculum Change
	   • Foundations of Curriculum Planning
	b) Teacher Education
	   • Structure of Teacher Education Curriculum
	   • Models of Teacher Education
	   • Concept, Need, Purpose and Scope of In-service Teacher Education
	   • Concept of Profession and Professionalism
	c) Educational Research
	   • Aims, approaches and Designs
	   • Meaning of Concepts, Constructs and Variables
	   • Types of Measurement Scale
	   • Qualitative Research Designs
	d) Educational Management & Administration
	   • Principles, Functions & Importance
	   • Approaches and Models to Leadership
	   • Quality in Education
	   • Change Management
	e) Guidance and Counseling
	   • Nature, Principles and Need for Guidance
	   • Types of guidance
	   • Approaches to Counseling
	   • Theories of Counseling
	f) Educational Technology
	   • Concept of Educational Technology
	   • Models of Development of Instructional Design
	   • Emerging Trends in e learning
	   • Use of ICT in Evaluation, Administration and Research
	g) Contemporary issues in Education
	   • Regulations and Acts in Education
	   • Global Trends in Education
	   • Role of Autonomous bodies and recent Schemes /programme in Education
	   • Quality Assessment and Assurance
	h) Assessment and Evaluation
	   • Test, Measurement, Assessment and Evaluation
	   • Types of Achievement Test
	   • Characteristics of good Test
	   • Models of Educational Evaluation and Assessment
	i) Education Policy
	   • Relationship Between Politics and Education			

	• Committees and Commissions' Contribution to Teacher Education • NEP 2020 • NCF 2023 j) Inclusive Education • Evolution of the Philosophy of Inclusive Education • Concept of Impairment, Disability and Handicap • Planning and Management of Inclusive Classrooms • Barriers and Facilitators in Inclusive Education **(120 Questions)**

SCHEME OF EXAMINATION ACADEMIC OFFICER (COMPUTER SCIENCE)

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 hour	
		No. of Questions	Marks
(i)	General Awareness	20	20
(ii)	Reasoning & Numerical Aptitude	20	20
(iii)	Test of English or Hindi	10	10
(iv)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

i. **General Awareness**: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

ii. **Reasoning & Numerical Aptitude:** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

iii. **Test of English or Hindi:** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

iv. **ICT Awareness:** The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B.   **Paper –II (MCQ) Academic Officer (Computer Science) :**

Duration : 2 Hours		Questions : 120	Marks : 120
S.No.	**Name of Post**	**ACADEMIC OFFICER (COMPUTER SCIENCE)**	
		Syllabus	
1.	**Unit - 1 : Discrete Structures and Optimization**	

Unit - 1 : Discrete Structures and Optimization

Mathematical Logic: Propositional and Predicate Logic, Propositional Equivalences, Normal Forms, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference.

Sets and Relations: Set Operations, Representation and Properties of Relations, Equivalence Relations, Partially Ordering.

Counting, Mathematical Induction and Discrete Probability: Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Inclusion-Exclusion Principle, Mathematical Induction, Probability, Bayes' Theorem.

Group Theory: Groups, Subgroups, Semi Groups, Product and Quotients of Algebraic Structures, Isomorphism, Homomorphism, Automorphism, Rings, Integral Domains, Fields, Applications of Group Theory.

Graph Theory: Simple Graph, Multigraph, Weighted Graph, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Planner graph, Graph Coloring, Bipartite Graphs, Trees and Rooted Trees, Prefix Codes, Tree Traversals, Spanning Trees and Cut-Sets.

Boolean Algebra: Boolean Functions and its Representation, Simplifications of Boolean Functions.

Optimization: Linear Programming - Mathematical Model, Graphical Solution, Simplex and Dual Simplex Method, Sensitive Analysis; Integer Programming, Transportation and Assignment Models, PERT-CPM: Diagram Representation, Critical Path Calculations, Resource Levelling, Cost Consideration in Project Scheduling.

Unit - 2 : Computer System Architecture

Digital Logic Circuits and Components: Digital Computers, Logic Gates, Boolean Algebra, Map Simplifications, Combinational Circuits, Flip-Flops, Sequential Circuits, Integrated Circuits, Decoders, Multiplexers, Registers and Counters, Memory Unit.

Data Representation: Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation, Error Detection Codes, Computer Arithmetic - Addition, Subtraction, Multiplication and Division Algorithms.

Register Transfer and Microoperations: Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift Microoperations.

Basic Computer Organization and Design: Stored Program Organization and Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Interrupt.

Programming the Basic Computer: Machine Language, Assembly Language, Assembler, Program Loops, Subroutines, Input-Output Programming.

Microprogrammed Control: Control Memory, Address Sequencing, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC Computer, CISC Computer.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing Array Processors.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Serial Communication.

Memory Hierarchy: Main Memory, Auxillary Memory, Associative Memory, Cache

Memory, Virtual Memory, Memory Management Hardware.

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Interprocessor Communication and Synchronization, Cache Coherence, Multicore Processors.

Unit - 3 : Programming Languages and Computer Graphics

Language Design and Translation Issues: Programming Language Concepts, Paradigms and Models, Programming Environments, Virtual Computers and Binding Times, Programming Language Syntax, Stages in Translation, Formal Transition Models.

Elementary Data Types: Properties of Types and Objects; Scalar and Composite Data Types.

Programming in C: Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions, File Handling, Command Line Argumaents, Preprocessors.

Object Oriented Programming: Class, Object, Instantiation, Inheritance, Encapsulation, Abstract Class, Polymorphism.

Programming in C++: Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.

Web Programming: HTML, DHTML, XML, Scripting, Java, Servlets, Applets.

Computer Graphics: Video-Display Devices, Raster-Scan and Random-Scan Systems; Graphics Monitors, Input Devices, Points and Lines; Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms; Scan Line Polygon Fill Algorithm, Boundary-Fill and Flood- Fill.

2-D Geometrical Transforms and Viewing: Translation, Scaling, Rotation, Reflection and Shear Transformations; Matrix Representations and Homogeneous Coordinates; Composite Transforms, Transformations Between Coordinate Systems, Viewing Pipeline, Viewing Coordinate Reference Frame, Window to View-Port Coordinate Transformation, Viewing Functions, Line and Polygon Clipping Algorithms.

3-D Object Representation, Geometric Transformations and Viewing: Polygon Surfaces, Quadric Surfaces, Spline Representation, Bezier and B-Spline Curves; Bezier and B-Spline Surfaces; Illumination Models, Polygon Rendering Methods, Viewing Pipeline and Coordinates; General Projection Transforms and Cipping.

Unit – 4 : Database Management Systems

Database System Concepts and Architecture: Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; Centralized and Client/Server Architectures for DBMS.

Data Modeling: Entity-Relationship Diagram, Relational Model - Constraints, Languages, Design, and Programming, Relational Database Schemas, Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Codd Rules.

SQL: Data Definition and Data Types; Constraints, Queries, Insert, Delete, and Update Statements; Views, Stored Procedures and Functions; Database Triggers, SQL Injection.

Normalization for Relational Databases: Functional Dependencies and Normalization; Algorithms for Query Processing and Optimization; Transaction Processing, Concurrency Control Techniques, Database Recovery Techniques, Object and Object-Relational Databases; Database Security and Authorization.

Enhanced Data Models: Temporal Database Concepts, Multimedia Databases, Deductive Databases, XML and Internet Databases; Mobile Databases, Geographic Information Systems, Genome Data Management, Distributed Databases and Client-Server Architectures.

Data Warehousing and Data Mining: Data Modeling for Data Warehouses, Concept Hierarchy, OLAP and OLTP; Association Rules, Classification, Clustering,

Regression, Support Vector Machine, K-Nearest Neighbour, Hidden Markov Model, Summarization, Dependency Modeling, Link Analysis, Sequencing Analysis, Social Network Analysis.

Big Data Systems: Big Data Characteristics, Types of Big Data, Big Data Architecture, Introduction to Map-Reduce and Hadoop; Distributed File System, HDFS.

NOSQL: NOSQL and Query Optimization; Different NOSQL Products, Querying and Managing NOSQL; Indexing and Ordering Data Sets; NOSQL in Cloud.

Unit – 5 : System Software and Operating System

System Software: Machine, Assembly and High-Level Languages; Compilers and Interpreters; Loading, Linking and Relocation; Macros, Debuggers.

Basics of Operating Systems: Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot.

Process Management: Process Scheduling and Operations; Interprocess Communication, Communication in Client–Server Systems, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores, Synchronization.

Threads: Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.

CPU Scheduling: Scheduling Criteria and Algorithms; Thread Scheduling, Multiple- Processor Scheduling, Real-Time CPU Scheduling.

Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and Detection; Recovery from Deadlock.

Memory Management: Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.

Storage Management: Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure.

File and Input/Output Systems: Access Methods, Directory and Disk Structure; File- System Mounting, File Sharing, File-System Structure and Implementation; Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance; Recovery, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

Security: Protection, Access Matrix, Access Control, Revocation of Access Rights, Program Threats, System and Network Threats; Cryptography as a Security Tool, User Authentication, Implementing Security Defenses.

Virtual Machines: Types of Virtual Machines and Implementations; Virtualization.

Linux Operating Systems: Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output; Interprocess Communication, Network Structure.

Windows Operating Systems: Design Principles, System Components, Terminal Services and Fast User Switching; File System, Networking.

Distributed Systems: Types of Network based Operating Systems, Network Structure, Communication Structure and Protocols; Robustness, Design Issues, Distributed File Systems.

Unit – 6 : Software Engineering

Software Process Models: Software Process, Generic Process Model – Framework Activity, Task Set and Process Patterns; Process Lifecycle, Prescriptive Process Models, Project Management, Component Based Development, Aspect-Oriented Software Development, Formal Methods, Agile Process Models – Extreme Programming (XP), Adptive Software Development, Scrum, Dynamic System Development Model, Feature Driven Development, Crystal, Web Engineering**.**

Software Requirements: Functional and Non-Functional Requirements; Eliciting Requirements, Developing Use Cases, Requirement Analysis and Modelling; Requirements Review, Software Requirment and Specification (SRS) Document.

Software Design: Abstraction, Architecture, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Cohesion and Coupling; Object-Oriented Design, Data Design, Architectural Design, User Interface Design, Component Level Design.

Software Quality: McCall's Quality Factors, ISO 9126 Quality Factors, Quality Control, Quality Assurance, Risk Management, Risk Mitigation, Monitoring and Management (RMMM); Software Reliability.

Estimation and Scheduling of Software Projects: Software Sizing, LOC and FP based Estimations; Estimating Cost and Effort; Estimation Models, Constructive Cost Model (COCOMO), Project Scheduling and Staffing; Time-line Charts.

Software Testing: Verification and Validation; Error, Fault, Bug and Failure; Unit and Integration Tesing; White-box and Black-box Testing; Basis Path Testing, Control Structure Testing, Deriving Test Cases, Alpha and Beta Testing; Regression Testing, Performance Testing, Stress Testing.

Software Configuration Management: Change Control and Version Control; Software Reuse, Software Re-engineering, Reverse Engineering.

Unit – 7 : Data Structures and Algorithms

Data Structures: Arrays and their Applications; Sparse Matrix, Stacks, Queues, Priority Queues, Linked Lists, Trees, Forest, Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree, B* Tree, Data Structure for Sets, Graphs, Sorting and Searching Algorithms; Hashing.

Performance Analysis of Algorithms and Recurrences: Time and Space Complexities; Asymptotic Notation, Recurrence Relations.

Design Techniques: Divide and Conquer; Dynamic Programming, Greedy Algorithms, Backtracking, Branch and Bound.

Lower Bound Theory: Comparison Trees, Lower Bounds through Reductions.

Graph Algorithms: Breadth-First Search, Depth-First Search, Shortest Paths, Maximum Flow, Minimum Spanning Trees.

Complexity Theory: P and NP Class Problems; NP-completeness and Reducibility.

Selected Topics: Number Theoretic Algorithms, Polynomial Arithmetic, Fast Fourier Transform, String Matching Algorithms.

Advanced Algorithms: Parallel Algorithms for Sorting, Searching and Merging, Approximation Algorithms, Randomized Algorithms.

Unit – 8 : Theory of Computation and Compilers

Theory of Computation: Formal Language, Non-Computational Problems, Diagonal Argument, Russels's Paradox.

Regular Language Models: Deterministic Finite Automaton (DFA), Non-Deterministic Finite Automaton (NDFA), Equivalence of DFA and NDFA, Regular Languages, Regular Grammars, Regular Expressions, Properties of Regular Language, Pumping Lemma, Non- Regular Languages, Lexical Analysis.

Context Free Language: Pushdown Automaton (PDA), Non-Deterministic Pushdown Automaton (NPDA), Context Free Grammar, Chomsky Normal Form, Greibach Normal Form, Ambiguity, Parse Tree Representation of Derivation Trees, Equivalence of PDA's and Context Free Grammars; Properties of Context Free Language.

Turing Machines (TM): Standard Turing Machine and its Variations; Universal Turing Machines, Models of Computation and Church-Turing Thesis; Recursive and Recursively- Enumerable Languages; Context-Sensitive Languages, Unrestricted Grammars, Chomsky Hierarchy of Languages, Construction of TM for Simple Problems.

Unsolvable Problems and Computational Complexity: Unsolvable Problem, Halting Problem, Post Correspondence Problem, Unsolvable Problems for Context-Free Languages, Measuring and Classifying Complexity, Tractable and Intractable Problems.

Syntax Analysis: Associativity, Precedence, Grammar Transformations, Top Down Parsing, Recursive Descent Predictive Parsing, LL(1) Parsing, Bottom up Parsing,

LR Parser, LALR(1) Parser.

Semantic Analysis: Attribute Grammar, Syntax Directed Definitions, Inherited and Synthesized Attributes; Dependency Graph, Evaluation Order, S-attributed and L-attributed Definitions; Type-Checking.

Run Time System: Storage Organization, Activation Tree, Activation Record, Stack Allocation of Activation Records, Parameter Passing Mechanisms, Symbol Table.

Intermediate Code Generation: Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls.

Code Generation and Code Optimization: Control-flow, Data-flow Analysis, Local Optimization, Global Optimization, Loop Optimization, Peep-Hole Optimization, Instruction Scheduling.

Unit – 9 : Data Communication and Computer Networks

Data Communication: Components of a Data Communication System, Simplex, Half- Duplex and Duplex Modes of Communication; Analog and Digital Signals; Noiseless and Noisy Channels; Bandwidth, Throughput and Latency; Digital and Analog Transmission; Data Encoding and Modulation Techniques; Broadband and Baseband Transmission; Multiplexing, Transmission Media, Transmission Errors, Error Handling Mechanisms.

Computer Networks: Network Topologies, Local Area Networks, Metropolitan Area Networks, Wide Area Network, Wireless Networks, Internet.

Network Models: Layered Architecture, OSI Reference Model and its Protocols; TCP/IP Protocol Suite, Physical, Logical, Port and Specific Addresses; Switching Techniques.

Functions of OSI and TCP/IP Layers: Framing, Error Detection and Correction; Flow and Error Control; Sliding Window Protocol, HDLC, Multiple Access – CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, CDMA, TDMA, Network Devices, Backbone Networks, Virtual LANs.

IPv4 Structure and Address Space; Classful and Classless Addressing; Datagram, Fragmentation and Checksum; IPv6 Packet Format, Mapping Logical to Physical Address (ARP), Direct and Indirect Network Layer Delivery; Routing Algorithms, TCP, UDP and SCTP Protocols; Flow Control, Error Control and Congestion Control in TCP and SCTP.

World Wide Web (WWW): Uniform Resource Locator (URL), Domain Name Service (DNS), Resolution - Mapping Names to Addresses and Addresses to Names; Electronic Mail Architecture, SMTP, POP and IMAP; TELNET and FTP.

Network Security: Malwares, Cryptography and Steganography; Secret-Key Algorithms, Public-Key Algorithms, Digital Signature, Virtual Private Networks, Firewalls.

Mobile Technology: GSM and CDMA; Services and Architecture of GSM and Mobile Computing; Middleware and Gateway for Mobile Computing; Mobile IP and Mobile Communication Protocol; Communication Satellites, Wireless Networks and Topologies; Cellular Topology, Mobile Adhoc Networks, Wireless Transmission and Wireless LANs; Wireless Geolocation Systems, GPRS and SMS.

Cloud Computing and IoT: SaaS, PaaS, IaaS, Public and Private Cloud; Virtualization, Virtual Server, Cloud Storage, Database Storage, Resource Management, Service Level Agreement, Basics of IoT.

Unit – 10 : Artificial Intelligence (AI)

Approaches to AI: Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.

Knowledge Representation: Logic, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency and Ontologies; Expert Systems, Handling Uncertainty in Knowledge.

Planning: Components of a Planning System, Linear and Non Linear Planning;

	Goal Stack Planning, Hierarchical Planning, STRIPS, Partial Order Planning.
	Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Prgamatics.
	Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools.
	Fuzzy Sets: Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems.
	Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.
	Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi Layer Perceptron, Self Organizing Maps, Hopfield Network.
	(120 Questions)

SCHEME OF EXAMINATION SECTION OFFICER

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	**Marks**
(i)	General Awareness	15	15
(ii)	Reasoning Ability	15	15
(iii)	Mathematical Ability	10	10
(iv)	Test of Language : English or Hindi	10	10
(v)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) ICT Awareness: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B. Paper –II (MCQ):

Duration: 2 Hours		Questions : 120	Marks : 120
S.No.	Name of Post	Syllabus	
1.	SECTION OFFICER	1. **Establishment/Financial Matters:** Advances, Children Education Allowance, Compensatory Allowances, CCS (Conduct) Rules, Departmental Promotion Committee, MACP, Deputation and Foreign Service, CCS(CCA)-Rules, House Allotment Rules, Income Tax, Joining Time, Leave Rules, Leave Travel Concession (LTC), CGHS, Medical Attendance Rules (CSMA Rules), Pay & Allowances, Pay Fixation, Provident Fund, Pension Rules, Reservations and Concession in appointments, Resignation, Removal and Dismissal, Retirement on Superannuation, Seniority and Promotion, Travelling Allowance, National Pension System and other Establishment matters. General Financial Rules-2017, Procurement of Goods and Services, works, PFMS, CAN Account, Treasury Single Account (TSA) **(120 Questions)**	

SCHEME OF EXAMINATION PUBLIC RELATIONS OFFICER

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	Marks
(i)	General Awareness	15	15
(ii)	Reasoning Ability	15	15
(iii)	Mathematical Ability	10	10
(iv)	Test of Language : English or Hindi	10	10
(v)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) ICT Awareness: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B.   Paper –II (MCQ) Public Relations Officer :

Duration : 2 Hours	Questions : 120	Marks : 120
S.No.	**Name of Post**	**PUBLIC RELATIONS OFFICER**
		Syllabus
1.	1. **Press Meet:** Press Release, Press Note, Press Conferences 2. **Speeches:** Concept and Types 3. **Print Media:** Marketing Material, Promotional Material 4. **Publications:** Indoor and Outdoor, House Journals 5. **Media Coverage:** Print, Electronic, Correspondence 6. **Image Building:** Reputation Management, Print and Video Promotional 7. **Advertising-** Concepts, Types, Tools, Print, Electronic, Digital, Copy Writing, Methods, Strategies, Target Audience 8. **Communication Goals:** Concepts and Tools 9. **PR Campaigns:** Public events, PR reports, Media Relations 10. **Social Media Campaign and Management:** SEO, Blogs, Web Pages, 11. **Market Research:** Concepts, Types, Tools, Methods and Strategies 12. **Crisis Management:** Concepts and Strategies 13. **Media Plans:** Methods and Strategies 14. **CSR Activities:** Concepts, Types, Tools 15. **Emotional Intelligence:** Concepts and Tools **(120 Questions)**		

SCHEME OF EXAMINATION EDP SUPERVISOR

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 hour	
		No. of Questions	Marks
(i)	General Awareness	20	20
(ii)	Reasoning Ability	20	20
(iii)	Mathematical Ability	10	10
(iv)	Test of Language : English or Hindi	10	10
	Total	60	60

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

B. Paper –II (MCQ) EDP SUPERVISOR :

Duration: 2 Hours		Questions : 120	Marks : 120
S.No.	Name of Post	EDP SUPERVISOR	
	Syllabus		
1.	1. Databases and Data Management: MySql, PostgreSQL, MongoDB, Amazon Relational Database Service, NoSQL, cloud computing, graph databases, machine learning, and augmented Data Management 2. Scripting/Programming Languages, web/mobile development tools: PHP, Python, JavaScript, HTML and CSS, C++, SQL, C#. React Native and Kotlin for mobile app development 3. Good knowledge of Web App Development Technologies, development of content management system, Utilization of Chatbots, Web Servers, Types of Cloud Computing Services, Infrastructure as a Service. (laaS), Platform as a Service. (PaaS), Software as a Service. (SaaS), Disaster Relief as a Service (DRaaS), Functions as a Service. 4. Cloud server technologies: Amazon Web Services (AWS), Microsoft Azure, Google Cloud, Oracle cloud, Amazon Simple Storage Service (Amazon S3) 5. Cloud computing features: Load balancing, Security and integrity, Privacy in multi-tenancy clouds, 6. Virtualisation, Data recovery and backup, Data segregation and recovery, Secure cloud architecture, Cloud cryptography. 7. Data security technologies: Data classification, Data access policies, Authentication, Access control, Backups & recovery, Encryption, Data masking, Tokenization, Deletions & erasure, Data Loss Prevention, Intrusion Detection System, Intrusion Prevention System, Security Incident and Event Management, Firewall, Antivirus 8. Cyber Security Technologies: Artificial Intelligence & Deep Learning, Behavioral Analytics, Embedded Hardware Authentication, Blockchain Cybersecurity, Zero-Trust Model 9. Configuration, maintenance and administration of Active directory, DC, ADC, DNS, DNCP, WSUS, Group policies, shared, workstation/printers, Antivirus. Configure and install various network devices and services (e.g. routers, switches, firewalls, load balancers, VPN, QoS) 10. Strong understanding and experience of Network protocols/services/ technologies like OSI, TCP/IP, UDP, BGP, OSPF, IP Sec, NAT and MPLS. 11. Working knowledge of the general mobile landscape, architectures, trends and emerging technologies 12. Knowledge of other computer related works & procedures. **(120 Questions)**		

SCHEME OF EXAMINATION GRAPHIC ARTIST

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	Marks
(i)	General Awareness	15	15
(ii)	Reasoning Ability	15	15
(iii)	Mathematical Ability	10	10
(iv)	Test of Language : English or Hindi	10	10
(v)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) ICT Awareness: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B.   Paper –II (MCQ) Graphic Artist :

Duration : 2 Hours	Questions : 120	Marks : 120
S.No.	**Name of Post**	**GRAPHIC ARTIST**
		Syllabus
1.	1. Graphic Design Fundamentals: • Typography • Colour theory • Layout and composition • Visual hierarchy 2. Software Proficiency: • Adobe Creative Suite (Photoshop, Illustrator, InDesign) • CorelDRAW • Sketch • Canva 3. Digital Illustration: • Creating original illustrations • Vector graphics • Character design • Iconography 4. Print Design: • Understanding of print production processes • Pre-press preparation • Knowledge of different paper types and finishes 5. Web Design: • User interface (UI) design • User experience (UX) principles • Responsive design • HTML and CSS knowledge (basic) 6. Logo Design: • Creating memorable and versatile logos • Brand identity development 7. Motion Graphics: • Adobe After Effects • Animation principles • Video editing skills (optional) 8. Photo Editing: • Image retouching • Photo manipulation • Colour correction 9. Typography: • Knowledge of various font families • Custom font creation (advanced) 10. Digital Marketing Design: • Social media graphics • Ad banners • Email marketing visuals 11. Knowledge of Design Trends: • Staying up-to-date with current design trends		

- Ability to adapt designs to fit contemporary styles
12. Communication:
    - Understanding requirements
    - Presenting design concepts
    - Handling feedback and revisions
13. Management:
    - Ability to manage multiple projects simultaneously
    - Meeting deadlines and prioritizing tasks
14. Creative Problem Solving:
    - Finding innovative design solutions
    - Thinking outside the box
15. Understanding of Branding:
    - Maintaining brand consistency in designs
    - Creating visual identities
16. Illustration Styles:
    - Familiarity with various illustration styles (e.g., flat design, realism, line art)
    - Freehand sketching and drawing
17. 3D Modelling and Animation:
    - Knowledge of 3D software (e.g., Blender, Cinema 4D)
    - Animation skills (if relevant to the job)
18. Knowledge of Copyright and Licensing:
    - Understanding of image rights and licenses
    - Avoiding copyright infringement
19. Portfolio Development:
    - Building and curating a strong portfolio
    - Showcasing a range of design work
20. Professional Development:
    - Willingness to learn and adapt to new tools and techniques
    - Seeking out training and educational resources

Additionally, soft skills such as creativity, attention to detail, and the ability to work collaboratively are also crucial for the role.

(120 Questions)

SCHEME OF EXAMINATION JUNIOR ENGINEER (ELECTRICAL)

The followings shall be the Scheme of Examination, components of Written Test (Paper-I & Paper–II):

A. Paper – I (MCQ Type):

Paper – I (MCQ Type)	Test Components	Duration : 1 Hour	
		No. of Questions	Marks
(i)	General Awareness	15	15
(ii)	Reasoning Ability	15	15
(iii)	Mathematical Ability	10	10
(iv)	Test of Language : English or Hindi	10	10
(v)	ICT Awareness	10	10
	Total	**60**	**60**

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) ICT Awareness: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

B.   Paper –II (MCQ) Junior Engineer (Electrical) :

Duration : 2 Hours		Questions : 120	Marks : 120
S.No.	Name of Post	JUNIOR ENGINEER (ELECTRICAL)	
	Syllabus		
1.	Basic concepts : Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units. Circuit law : Kirchhoff's law, Simple Circuit solution using network theorems. Magnetic Circuit : Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction. AC Fundamentals: Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-L and R-C circuit. Measurement and measuring instruments: Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving oil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection. Electrical Machines : (a) D.C. Machine – Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses. Parallel operation of 1 phase /3 phase transformers. Auto transformers. (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics. Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications. Synchronous Machines - Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors. Generation, Transmission and Distribution – Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults. Switchgears – rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of		

conductor materials, efficiency of different system. Cable – Different type of cables, cable rating and derating factor.

Estimation and costing : Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.

Utilization of Electrical Energy : Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.

Basic Electronics : Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.

(120 Questions)

SCHEME OF EXAMINATION ASSISTANT

The followings shall be the Scheme of Examination, components of Written Test :

A. (MCQ Type):

(MCQ Type)	Test Components	Duration : 3 Hours	
		No. of Questions	Marks
(i)	General Awareness	30	30
(ii)	Reasoning Ability	40	40
(iii)	Mathematical Ability	40	40
(iv)	Office Procedures	30	30
(v)	Test of Language : English or Hindi	30	30
(vi)	ICT Awareness	10	10
	Total	**180**	**180**

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) Office Procedures : proficiency in office procedure, noting , drafting, Knowledge of Govt. of India Rules and Regulations

(vi) ICT Awareness: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

SKILL TEST : Working on Computers with a speed of not less than 8000 Key Depression per hour. (Skill Test shall be qualifying in nature and no additional credits for the same shall be allocated)

SCHEME OF EXAMINATION STENOGRAPHER

The followings shall be the Scheme of Examination, components of Written Test :

A. (MCQ Type):

(MCQ Type)	Test Components	Duration : 3 Hours	
		No. of Questions	Marks
(i)	General Awareness	40	40
(ii)	Reasoning Ability	50	50
(iii)	Mathematical Ability	50	50
(iv)	Test of Language : English Or Hindi	20	20
(v)	ICT Awareness	20	20
	Total	**180**	**180**

Syllabus:
(i) **General Awareness**: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.
(ii) **Reasoning Ability:** The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.
(iii) **Mathematical Ability**: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.
(iv) **Test of English or Hindi:** In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.
(v) **ICT Awareness:** The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

SKILL TEST : Speed in shorthand in English/Hindi @80 w.p.m with computer speed of 8000 key depressions per hour. (Skill Test shall be qualifying in nature and no additional credits for the same shall be allocated)

SCHEME OF EXAMINATION JUNIOR ASSISTANT

The followings shall be the Scheme of Examination, components of Written Test :

A.   (MCQ Type):

(MCQ Type)	Test Components	Duration : 3 Hours	
		No. of Questions	Marks
(i)	General Awareness	40	40
(ii)	Reasoning Ability	50	50
(iii)	Mathematical Ability	50	50
(iv)	Test of Language : English Or Hindi	20	20
(v)	ICT Awareness	20	20
	Total	**180**	**180**

Syllabus:

(i)   General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii)   Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii)   Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv)   Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v)   ICT Awareness: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Operating systems, Word Processing, Internet, and Security & Networking etc.

SKILL TEST : Working on Computers with a speed of not less than 6000 Key Depression per hour. (Skill Test shall be qualifying in nature and no additional credits for the same shall be allocated)

SCHEME OF EXAMINATION MULTI TASKING STAFF

The followings shall be the Scheme of Examination, components of Written Test :

A. (MCQ Type):

(MCQ Type)	Test Components	Duration : 3 Hours	
		No. of Questions	Marks
(i)	General Awareness	50	50
(ii)	Reasoning Ability	50	50
(iii)	Mathematical Ability	30	30
(iv)	Test of Language : English or Hindi	30	30
(v)	Digital Literacy	20	20
	Total	**180**	**180**

Syllabus:

(i) General Awareness: Questions will be designed to test the ability of the candidate's General Awareness of the environment and its relevance to the society. The questions will also be designed to test knowledge of the current events and of such matters of everyday observation as may be expected of an educated person. The test will include questions relating to India and its neighboring countries, especially pertaining to History, India Policy & Constitution. Art & Culture, Geography, Economics, General Policy. Science & Scientific Research. National/ International Organizations/ Institutions events etc.

(ii) Reasoning Ability: The syllabus includes questions of both verbal and non-verbal types. Test may include questions on analogies, similarities. Differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship, concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc.

(iii) Mathematical Ability: The test will cover Number System including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, and Profit & Loss. Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

(iv) Test of English or Hindi: In addition to the testing of candidate's understanding of the English **or** Hindi Languages, its Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, and its correct usage etc. would also be tested.

(v) Digital Literacy: The test will cover Computer Fundaments, Basic Applications of Computer, Components of Computer, Computer Hardware & Software, Internet, Handling photocopier/scanner.