

# DMRC SC/TO Syllabus

## DMRC SC/TO Paper-1 Exam Pattern

S.No	Paper Type	Section	Subjects	Number of Questions	Marks	Duration
1	Objective	Technical	Physics	120 Questions	120 Marks	90 Minutes
2			Chemistry			
3			Mathematics			
4		Non-Technical	General Knowledge			
5			Current Affairs			
6			Quantitative Aptitude			
7			Reasoning			

## DMRC SC/TO Paper-2 Exam Pattern

S.No	Paper Type	Subject	Number of Questions	Marks	Duration
1	objective	English	60Questions	60 Marks	45 Minutes

## DMRC SC TO Syllabus

### DMRC station controller Syllabus – Mathematics

- Sets
- Relations and Functions
- Mathematical Induction
- Logarithms
- Complex numbers
- Linear and Quadratic Equations.
- Sequences and Series.
- Trigonometry.
- Cartesian System of Rectangular Coordinates.
- Straight lines and Family.
- Circles.
- Conic Sections.
- Permutations and Combinations.
- Binomial Theorem.
- Exponential and Logarithmic Series.
- Mathematical Logic.

- Statistics.
- Three Dimensional Geometry.
- Vectors, Stocks.
- Shares and Debentures.
- Average and Partition Values.
- Index numbers.
- Matrices and Determinants.
- Boolean Algebra.
- Probability.
- Functions.
- Limits and Continuity.
- Differentiation.
- Application of Derivatives.
- Definite and Indefinite Integrals.
- Differential Equations.
- Elementary Statics and Dynamics.
- Partnership.
- Bill of Exchange.
- Linear Programming.
- Annuities.
- Application of Calculus in Commerce and Economics.

#### DMRC SC TO Syllabus – Physics

- Physical World and Measurement.
- Kinematics.
- Laws of Motion.
- Work.
- Energy and Power.
- Electrostatics.
- Current electricity.
- Magnetic Effects of Current and Magnetism.
- Electromagnetic Induction and Alternating Current.
- Electromagnetics Waves.
- Optics.
- Dual Nature of Matter and Radiations.
- Atomic Nucleus.
- Solids and Semiconductor Devices.
- Principles of Communication.
- Motion of System of Particles and Rigid Body.
- Gravitation.

- Mechanics of Solids and Fluids.
- Heat and Thermodynamics.
- Oscillations.
- Waves.

## SC/TO Syllabus of DMRC – Chemistry

### Physical Chemistry

**Basic Mathematical Concepts:** Differential equations, vectors, and matrices.

**Atomic Structure:** Fundamental particles. Bohr's theory of hydrogen atom; Wave-particle duality; Uncertainty principles; Schrodinger's wave equation; Quantum numbers, shapes of orbitals; Hund's rule and Pauli's exclusion principle.

**Theory of Gases:** Kinetic theory of gases. Maxwell-Boltzmann distribution law; Equipartition of energy.

**Chemical Thermodynamics:** Reversible and irreversible processes; First law and its application to ideal and nonideal gases; Thermochemistry; Second law; Entropy and free energy, Criteria for spontaneity.

**Chemical and Phase Equilibria:** Law of mass action;  $K_p$ ,  $K_c$ ,  $K_x$  and  $K_n$ ; Effect of temperature on  $K$ ; Ionic equilibria in solutions; pH and buffer solutions; Hydrolysis; Solubility product; Phase equilibria—Phase rule and its application to one-component and two-component systems; Colligative properties.

**Electrochemistry:** Conductance and its applications; Transport number; Galvanic cells; EMF and Free energy; Concentration cells with and without transport; Polarography.

**Chemical Kinetics:** Reactions of various order, Arrhenius equation, Collision theory; Theory of absolute reaction rate; Chain reactions – Normal and branched chain reactions; Enzyme kinetics; Photophysical and photochemical processes; Catalysis.

### Organic Chemistry

**Basic Concepts in Organic Chemistry and Stereochemistry:** Isomerism and nomenclature, electronic (resonance and inductive) effects. Optical isomerism in compounds containing one and two asymmetric centers, designation of absolute configuration, conformations of cyclohexanes.

**Aromaticity and Huckel's rule:** Mono and bicyclic aromatic hydrocarbons.

**Organic Reaction Mechanism and Synthetic Applications:** Methods of preparation and reactions of alkanes, alkenes, alkynes, arenes and their simple functional derivatives. Mechanism and synthetic applications of electrophilic aromatic substitution. Stereochemistry and mechanism of aliphatic nucleophilic substitution and elimination reactions. Mechanism of aldol condensation, Claisen condensation, esterification and ester hydrolysis, Cannizzaro reaction, benzoin condensation. Perkin reaction, Claisen rearrangement, Beckmann rearrangement and Wagner-Meerwein rearrangement.

Synthesis of simple molecules using standard reactions of organic chemistry. Grignard reagents, acetoacetic and malonic ester chemistry.

**Natural Products Chemistry:** Introduction to the following classes of compounds-alkaloids, terpenes, carbohydrates, amino acids, peptides and nucleic acids.

**Heterocyclic Chemistry:** Monocyclic compounds with one heteroatom.

Qualitative Organic Analysis: Functional group interconversions, structural problems using chemical reactions, identification of functional groups by chemical tests.

## Inorganic Chemistry

**Periodic Table:** Periodic classification of elements and periodicity in properties; general methods of isolation and purification of elements.

**Chemical Bonding and Shapes of Compounds:** Types of bonding; VSEPR theory and shapes of molecules; hybridization; dipole moment; ionic solids; Structure of NaCl, CsCl, diamond, and graphite; lattice energy.

**Main Group Elements (S and P blocks):** Chemistry with Emphasis on group relationship and gradation in properties; Structure of electron deficient compounds of main group elements and application of main group elements.

**Transition Metals (D block):** Characteristics of 3d elements; oxide, Hydroxide, and salts of first row metals; coordination complexes; VB and Crystal Field theoretical approaches for structure, color and magnetic properties of metal complexes.

**Analytical Chemistry:** Principles of qualitative and quantitative analysis; acid-base, oxidation-reduction, and precipitation reactions; use of indicators; use of organic reagents in an inorganic analysis; radioactivity; nuclear reactions; applications of isotopes.

### DMRC SC TO Syllabus – General Knowledge

- Festivals of India.
- Inventions.
- Indian languages.
- Discovery of Bronze.
- Invention of Compact Disc.
- Natural Wonders of the World.
- Famous Leaders.
- Famous People.
- Nobel Prize Winners.
- Computer Bytes.
- Diseases.

- Scientific Terms.
- Sportspersons.
- Asian games.
- Cricketers around the world.
- Indian airports.
- Mountains and Peaks.

#### Delhi Metro Exam Syllabus – Current Affairs

- Current Events.
- Economic Scene.
- Sports.
- Scientific Research.
- History.
- Culture.
- Geography.
- General Polity including Indian Constitution.
- Countries & Currencies.
- Countries and Capitals.
- National & International affairs.
- States & Capitals.
- Daily News.
- Famous Personalities.
- Art & Culture.
- Sports & Games.
- Current GK.

#### DMRC Station Controller Exam Syllabus – Aptitude

- Time and Work.
- Simple and Compound Interest.
- Unitary Method.
- Decimal Fractions.
- Algebra.
- Number System.
- Percentage, Time and Distance.
- HCF, LCM.
- Average.
- Profit and Loss.
- Data Interpretation.
- Mensuration (2D and 3D).

### DMRC SC Syllabus PDF – Reasoning

- Spatial Visualization.
- Arithmetical Reasoning.
- Similarities and Differences.
- Observation.
- Arithmetic Number Series.
- Relationship concepts.
- Spatial Orientation.
- Visual Memory.
- Discrimination.
- Figures Classification.
- Non-verbal series.
- Analogies.
- Coding and Decoding etc.

### DMRC Syllabus for Station Controller and Train Operator (Paper-2)

#### DMRC SC TO Syllabus – English

- Reading Comprehension.
- Writing Skills and Grammar.
- Literature and Long Reading Texts.
- Long Reading Texts / Novels.
- Speaking and Listening Skills.
- Verbs.
- Adverbs.
- Nouns.
- Parts of Speech.
- Editing.
- Letter – Formal.
- Letter – Informal.
- Paragraph Writing.
- Notice.
- Speech.
- Article Writing.
- Factual Passages.
- Discursive Passages.
- Literary Passages.
- Report Writing.
- Email.
- Bio Sketch.

- Data Interpretation.
- Process Description.
- Story Writing.
- Description of Persons, Places, and Events.
- Direct – Indirect Speech.
- Dialogue Writing.
- Diminutives.
- Single word for a group of words.
- Antonyms.
- Synonyms.
- Idioms.
- Proverbs.
- Homes and Places.
- Figures of Speech.
- Phrasal Verbs.
- Rhyming Words.
- Homonyms.
- Homophones.
- Jumbled Words.