SRSMT Scholarship Test Syllabus

Non-Medical & Medical

PHYSICS

1. **Measurement:** Units and dimensions, least count, significant figures and error analysis.

2. **Mechanics**: Kinematics in one and two dimensions, Circular motion, Relative velocity, projectiles, Newton's laws of motion; Inertial and non-inertial frames of reference; Friction, Kinetic and potential energy, Conservation of linear momentum and mechanical energy, Centre of mass and its motion, Impulse, Law of gravitation, Gravitational potential and field, Acceleration due to gravity, moment of inertia,

3. **Work, Energy and Power**: Work done by force, Kinetic and potential energy, law of conservation of energy, Power.

4. **Optics**: Reflection and refraction, Total internal reflection; dispersion, mirrors and lenses, Huygen's principle, Young's double-slit experiment.

5. **Heat and Thermodynamics**: Thermal expansion; Calorimetry, latent heat; Heat conduction, Newton's law of cooling; Ideal gas laws, Specific heats, Isothermal and adiabatic processes, Equivalence of heat and work, First law of thermodynamics.

6. **Electricity and Magnetism**: Coulomb's law; Electric field and potential, Gauss's law, Ohm's law, Resistors and Capacitors in series and parallel, Energy stored in a capacitor, Kirchhoff's laws, Heating effect of current, Force on a moving charge and on a current carrying wire in a uniform magnetic field, Magnetic moment of a current loop, Faraday' s law, Lenz's law, Self and mutual inductance, Electromagnetic waves, Displacement current.

7. **Modern Physics**: Atomic nucleus, Alpha and beta particles, gamma radiation; Law of radioactive decay, Fission and fusion processes, Photoelectric effect, Characteristic and continuous X-rays, de Broglie wavelength of matter waves.

CHEMISTRY

1. **Atomic Structure:** Dual nature of matter and radiation, Heisenberg uncertainty principle, quantum mechanical model of atom (quantum designation of atomic orbitals and electron energy in terms of principal, angular momentum and magnetic quantum numbers), electronic spin and spin quantum numbers, Pauli's exclusion principle, *Aufbau* principle, Hund's rule, atomic orbitals and their pictorial representation, electronic configurations of elements.

2. **Classification of elements and periodicity in properties:** Modern periodic law and present form of periodic table, electronic configurations of elements and periodic table, electronic configuration and types of elements.

3. **Chemical bonding:** Kossel -Lewis approach to chemical bond formation, ionic bonds, covalent bonds, polarity of bonds and concept of electronegativity, valence shell electron pair repulsion (VSEPR) theory, shapes of simple molecules, valence bond theory.
4. **Ionic equilibrium and Redox reactions:** Acids, Bases and Salts and their ionization, weak and strong electrolytes degree of ionization and ionization constants, concept of pH, ionic product of water, Electronic concepts of reduction - oxidation, redox reactions, oxidation number, balancing of redox reactions.

5. **Thermodynamics:** Laws of thermodynamics, system and surrounding, heat, work, internal energy, enthalpy.

6. **Electrochemistry:** Conductance in electrolytic solutions, specific and molar conductivity, variation of conductivity with concentration, electrolysis and laws of electrolysis, electrolytic and galvanic cells, emf. of a cell, standard electrode potential, Nernst equation.
7. **Coordination Compounds:** Basic ideas of Crystal Field Theory, colour and magnetic properties.

8. **Hydrocarbons:** Alkanes, Alkene and Alkynes: classification, nomenclature and important reactions. Aromatic hydrocarbons: structure and chemical reaction of benzene, IUPAC Nomenclature.

MATHEMATICS

1. **Complex Numbers:** Solution of the quadratic equations. Algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Square root of a complex number.
2. **Continuity and Differentiability:** Inverse of a function, Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit functions. Concept of exponential and logarithmic functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms.

3. **Applications of Derivatives:** Rate of change of bodies, increasing/decreasing functions, maxima and minima.

4. **Integration:** Integration of a variety of functions by substitution, by partial fractions and by parts, Fundamental Theorem of Calculus, Basic properties of definite integrals and evaluation of definite integrals.

5. **Applications of the Integrals**: Applications in finding the area under simple curves.

6. **Differential Equations:** Order and degree. General and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations of first order and first degree by method of separation of variables of homogeneous differential equations. Solutions of linear differential equation of order one.

7. **Probability:** Conditional probability, multiplication theorem on probability, independent events, total probability, Baye's theorem.

8. **Matrices and Determinants:** Matrix operations (Addition, multiplication and scalar multiplication of matrices), Inverse of a matrix, Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations

9. **Vector Algebra:** Properties and applications of scalar(dot) product of vectors, vector (cross) product of vectors.

ENGLISH

1. Grammar: Agreement, Time and Tense, Parallel construction, Relative pronouns, Determiners, Prepositions, Modals, Adjectives, Voice, Transformation, Question tags, Phrasal verbs.
2. Vocabulary: Synonyms, Antonyms, Odd Word, One Word, Jumbled letters, Homophones, Spelling, Contextual meaning, Analogy.
3. Reading Comprehension: Content/ideas, Vocabular, Referents, Idioms/Phrases, Reconstruction (rewording).
4. Composition: Rearrangement, Paragraph Unity, Linkers/Connectives.

GENERAL KNOWLEDGE

1. Last 1 Year Current Affairs of National and International level in India and its neighboring countries.

BIOLOGY

Unit 1: Cell division

Cell cycle, mitosis, meiosis and their significance

Unit 2: Genetics and Evolution

Principles of Inheritance and Variation Heredity and variation: Mendelian inheritance; deviations from Mendelism – incomplete dominance, co-dominance, multiple alleles and inheritance of blood groups, Structure of DNA and RNA; DNA packaging; DNA replication; Central Dogma; transcription, genetic code, translation; gene expression and regulation - lac operon; Genome, Human and rice genome projects; DNA fingerprinting

Unit 3: Biology and Human Welfare

Pathogens; parasites causing human diseases (malaria, dengue, chikungunya, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm) and their control; Basic concepts of immunology - vaccines; cancer, HIV and AIDS; Adolescence - drug and alcohol abuse. Microbes in food processing, industrial production, sewage treatment, energy generation and microbes as bio-control agents and bio-fertilizers. Antibiotics; production and judicioususe.

Unit 4: Biotechnology

Genetic Engineering (Recombinant DNA Technology). Biotechnology and its Applications Application of biotechnology in health and agriculture: Human insulin and vaccine production, stem cell technology, gene therapy; genetically modified organisms - Bt crops; transgenic animals

Unit 5: Ecology and Environment

Population interactions - mutualism, competition, predation, parasitism; population attributes - growth, birth rate and death rate, age distribution, Biodiversity-Concept, patterns, importance; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction

Unit 6: Cell-The Unit of Life:

Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system, endoplasmic reticulum, golgi bodies, lysosomes, vacuoles, mitochondria, ribosomes, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.

Unit 7: Biomolecules

Structure and functions of proteins, carbohydrates, lipids and nucleic acids