

# SRSMT Scholarship Test-2025 Syllabus

## (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 noninertial frames of reference; Friction, Kinetic and potential energy, Work and power, 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, Rigid body, moment of inertia,
- 3. Properties of Bulk Matter:** Hooke's law, Young's modulus, Pascal's law, Buoyancy, Surface energy and surface tension, Viscosity, Stoke's law, Terminal velocity, Streamline flow, Bernoulli's theorem
- 4. Waves and Oscillations:** Wave motion, longitudinal and transverse waves, Superposition of waves, progressive and stationary waves, Resonance, Beats, Speed of sound in gases, Simple harmonic motions.
- 5. Optics:** Reflection and refraction, Total internal reflection; dispersion, mirrors and lenses, Huygen's principle, Young's double-slit experiment.
- 6. 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.
- 7. 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, Biot-Savart law and Ampere's law, 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.
- 8. 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, hybridization involving s, p and d orbitals and shapes of molecules  $\sigma$  and  $\pi$  bonds, Hydrogen-bonding.
- 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. Solutions:** Vapour pressure of solutions and Raoult's Law, Colligative properties, lowering of vapour pressure, depression of freezing point, elevation of boiling points and osmotic pressure, d
- 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. Some basic principles of Organic Chemistry:** inductive effect, electromeric effect, resonance and hyperconjugation. Common types of organic reactions: substitution, addition, elimination and rearrangement reactions.
- 9. Hydrocarbons:** Alkanes, Alkene and Alkynes: classification, nomenclature and important reactions. Aromatic hydrocarbons: structure and chemical reaction of benzene, IUPAC Nomenclature.
- 10. Organic compounds with functional groups:** Relative reactivity and properties of Alcohols and phenols.

## BIOLOGY

### Unit-1: Reproduction in Organisms

Reproduction, a characteristic feature of all organisms for continuation of species; modes of reproduction – asexual and sexual reproduction; asexual reproduction – binary fission, sporulation, budding, gemmule formation, fragmentation; vegetative propagation in plants.

### Unit-2: Sexual Reproduction in Flowering Plants

Flower structure; development of male and female gametophytes; pollination – types, agencies and examples; outbreeding devices; pollen-pistil interaction; double fertilization; post fertilization events – development of endosperm and embryo, development of seed and formation of fruit; special modes- apomixis, parthenocarpy, polyembryony; Significance of seed dispersal and fruit formation.

### Unit-3: Human Reproduction

Male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis – spermatogenesis and oogenesis; menstrual cycle; fertilisation, embryo development upto blastocyst formation, implantation; pregnancy and placenta formation (elementary idea); parturition (elementary idea); lactation (elementary idea).

### Unit-4: Principles of Inheritance and Variation

Heredity and variation: Mendelian inheritance; deviations from Mendelism – incomplete dominance, co- dominance, multiple alleles and inheritance of blood groups, pleiotropy; elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and genes; Sex determination – in humans, birds and honey bee; linkage and crossing over; sex linked inheritance – haemophilia, colour blindness; Mendelian disorders in humans –thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

### Unit-5: Molecular Basis of Inheritance

Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; transcription, genetic code, translation; gene expression and regulation – lac operon; genome and human and rice genome projects; DNA fingerprinting.

### Unit-6: Evolution

Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidences); Darwin's contribution, modern synthetic theory of evolution; mechanism of evolution – variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy – Weinberg's principle; adaptive radiation; human evolution.

### Unit-7: Human Health and Diseases

Pathogens; parasites causing human diseases (malaria, dengue, chickengunia, 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.

### Unit-8: Benefits of microorganisms

Improvement in food production: Plant breeding, tissue culture, single cell protein, Bio fortification, Apiculture and Animal husbandry.

In household food processing, industrial production, sewage treatment, energy generation and microbes as biocontrol agents

and bio fertilizers. Antibiotics; production and judicious use.

### **Unit-9: Genetic Engineering (Recombinant DNA Technology) Applications of Biotechnology**

Application of biotechnology in health and agriculture: Human insulin and vaccine production, stem cell technology, gene therapy; genetically modified organisms – Bt crops; transgenic animals; biosafety issues, bio piracy and patents.

### **Unit-10: Ecosystem and Environmental Issues**

Ecosystems: Patterns, components; productivity and decomposition; energy flow; pyramids of number, biomass, energy; nutrient cycles (carbon and phosphorous); ecological succession; ecological services – carbon fixation, pollination, seed dispersal, oxygen release (in brief).

Air pollution and its control; water pollution and its control; agrochemicals and their effects; solid waste management; radioactive waste management

### **Unit-11: Biodiversity and its Conservation**

Concept of biodiversity; patterns of biodiversity; importance of biodiversity; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, national parks, sanctuaries and Ramsar sites.

## **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.