M.Tech in Materials Science

Syllabus for Entrance Test

Syllabus covers 5 major subjects: Physics, Chemistry, Mathematics, Biology, and Elements of Computing.
The minimum expected level is +2 level

Physics

Unit – 1

Interference, Diffraction, Simple harmonic motion, Kepler's law, angular momentum, uniform circular motion, motion of a particle in central force, viscosity, surface tension, Young's modulus, moment of inertia, thermodynamic laws, isothermal adiabatic, expansions, specific heats, entropy, enthalpy, free energy, Maxwell – Boltzmann distribution.

Unit – 2

UV- Visible Spectra, Infrared spectra, Fourier transform infrared spectra, Raman spectra, Mie scattering, Rayleigh scattering, X-ray diffraction, Bragg's law, space lattice, Nacl and KCl structures, Nuclear Magnetic Resonance, Fermi energy.

Chemistry

Unit – 3

Inorganic Chemistry-

Atomic structure, periodic properties, Chemical bonding, Hydridization, Molecular obtial theory, Noble gas compounds, Nuclear Chemistry, Indicators, d-block elements, f-block elements coordination chemistry, Physical methods of study of complexes, Inorganic Polymers metallurgy.

Unit – 4

Organic Chemistry –

Classification and nomenclature of alkenes, alkali halides, Mechanism of organic reactions, Alcohols, Phenols, Amines, Carbonyl Compounds, Carboxylic acids, cyclo- alkanes, Aromatic hydrocarbons, Heterocyclic compounds, Dyes, oil, Fats, Waxes, Soaps and detergents, Polymers.

Unit-5

Physical Chemistry –

Gases, Adsorption, Catalysis, Liquid mixtures, Colligative properties, Phase equilibrium, Chemical Kinetics, Electrochemistry, Corrosion, Elementary Quantum mechanics, Colloids, Radioactivity, Surface Chemistry.

Mathematics

Unit 6

Elements of set theory, Mathematical logic, Matrices and Determinants, Vectors and Groups, Circles and Conic sections.

Unit 7

Trigonometric functions and inverse trigonometric functions, Differentiation and Integration, Differential equations.

Biology

Unit -8

Classification of bacteria, Viruses and fungi, structure of prions and viroids, classification of biopolymers, Carbohydrates, Proteins, Lipids, Terpenes, Steroids, Alkaloids, Vitamins, Phenols, Organic acids.

Unit-9

Enzymes, antibodies, photosynthesis, respiration, metabolism, catabolism, amino acids, nutrition, clinical diagnostics, structure and replication of DNA and RNA, protein synthesis, immunology.

Elements of Computing

Unit- 10

Elements of computing concepts of algorithms, integer arithmetic, floating arithmetic, number systems, Boolean algebra, Essential tools- Word Processing, Spread sheets, simple operating System commands, Basic block diagram of a computer, basic input and output devices.