

Syllabus for Combined M.Tech Nano Science & Technology Entrance exam

The syllabus for M.Tech Nano Science & Technology combined Entrance examination will comprise total of 100 objective type questions. The test will be of 90 minutes duration. The syllabus is as follows:

Microbiology:

Introduction - Historical Background and scope, and impact of microbes on human affairs. Difference between Eubacteria, Archaeobacteria and Eukaryotes, Pure culture techniques, Sterilization techniques, Principle of Microbial growth & microbial nutrition, Classification of Bacteria, Viruses: General characteristics, Morphology, Classification of plant, animal and bacterial viruses, Cultivation of viruses. Control of Microorganism by Physical & Chemical agents, Microbial Ecology, Role of Microorganisms in foods, agriculture, environment and industry.

Instrumentation Techniques

Microscopic Techniques, Chromatography Techniques, Gel Electrophoresis Techniques, Spectroscopic Techniques etc.

Recombinant DNA Technology

Introduction- Historical background, Restriction enzymes, Gene cloning, vectors, Polymerase Chain Reaction- basic principle, Applications of PCR in biotechnology, Molecular Markers and DNA Chip Technology: Molecular Markers- types and applications, Genomics and proteomics, Construction of molecular maps (genetic and physical maps), DNA chip Technology & Microarrays (a brief account). Biotechnology in medicine, Nano Medicine & Drug Delivery, Vaccines, Diagnostic, Forensic, Gene therapy, Cell & Tissue Engineering, Stem Cell Theory, Transgenic plants & animals, Bioremediation and phytoremediation.

Animal Biotechnology:

Transgenic Animals, Immuno-technology, Antigens and antigenicity, Active and passive Immunity, Immunity, Hybridoma technology, Immunological techniques, ELISA, RIA, Immuno-Diffusion, Immuno- Electrophoresis.

Nano Science & Technology:

An Overview, Nanomaterials- types and synthesis, current status and products, safety and toxicological evaluation, MEMS & NEMS, Biosensors, Societal implications & Ethical issues in Nano Science and Nanotechnology, Applications of Nanotechnology in different areas of Food, Agriculture, Textile and Medical Sciences.

B.Tech/ M.Sc level syllabus of Quantum and statistical mechanics, physical, organic and inorganic chemistry- structure of matter, bondings, Different types of materials: Metals, Semiconductors, Composite materials, Ceramics, Alloys, Polymers, introduction to computer science- Basics and languages, Biomedical implants, Biomaterials, Textile nanofibres and nono fabrics etc

Introduction to biomolecules and cellular organization

Structure of atoms, molecules and chemical bonds, Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins)., Stabilizing interactions, glycolysis, oxidative phosphorylation, Principles of catalysis, enzymes and enzyme kinetics. Membrane structure and function: Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps.

Structural organization and function of intracellular organelles. Organization of genes and chromosomes: Operon, structure of chromatin and chromosomes, transposons. Cell division and cell cycle.

General Knowledge related to engineering principles