

2023-24

Syllabus for Entrance Test to Ph.D. (Nano Science & Technology)

Introduction & Background: Introduction to nanotechnology, History, recent advances and future aspects, Applications of nanotechnology in different fields- agriculture, medical, space defence, food processing, cosmetics etc, Societal implications & Ethical issues in nanotechnology.

Instrumentation Techniques for Nanotechnology: FTIR, DSC, DTA, TGA, Low Energy Electron Diffraction (LEED), Scanning Probe Microscopy, Low Temperature Scanning Probe Microscopy, Auger, SEM, TEM, XRD (Powder/single crystal), AFM, Scanning Tunneling Microscopy (STM), EDX, ESCA etc.

Introduction to Quantum & Statistical Mechanics and Chemistry of solids, types of materials and properties.

Nanomaterials- Types, properties, synthesis and applications, Carbon nanotubes-current status of the scientific research synthesis, devices, properties, characterization methods & CNT electronics integrated systems, applications in biotechnology and biomedicine, Nanowires- synthesis, methods, physical properties, characterization methods and applications, Smart materials. Nanoparticles- in paints, adhesives and coatings, pressure sensitive adhesives in biotechnology, Nanostructured Fluids and Soft Materials-types, applications in drug solubilisation and delivery, nutraceuticals, functional foods, antimicrobial and cosmetic nanoemulsions, food colloids etc.

Micro/Nanofabrication Techniques- MEMS and NEMS, Advances in material aspects & fabrication techniques, Stamping techniques, Nanolithography techniques; applications, current challenges and future aspects, Therapeutic nanodevices

Micro fluidics and their Applications: Advances in microfluidic research, material aspects for microfluidic devices, active and smart passive micro fluidics devices, Lab-on-a-chip for Biochemical analysis.

Bionanotechnology and Advances in Biomolecular Design, Bio nanostructure- Applications and Perspectives, Nanomedicine and Drug delivery – A brief Account

Semiconductor Nano particles: Synthesis, Semiconductor nanoparticles size dependant physical properties. Semiconductor nanoparticles applications Semiconductor nanowires, Advances in functional aspects of bionanotechnology

Chairman