

## **Syllabus for M.Tech. Entrance Examination (Nanotechnology), (MEENT-2021)**

**Numerical Analysis** : Differentiation, Integration, introduction to sampling and sampling distributions like Chi-square, t and F distributions, test of significance based on t, Chi-square and distributions, Matrices : Rank of Matrix, Eigen Values and Eigen Vectors, Inverse of a Matrix, Newton Raphson method, Euler method, Runge Kutta.

**(10)**

**Semiconductor Properties of matter** : Semiconductors, Concept of energy band diagram for materials - conductors, semiconductors and insulators, electrical conductivity effect of temperature on conductivity, intrinsic and extrinsic semiconductors, dielectric properties. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers, Types of diodes, LEDs, Inductors, Resistors, Capacitors, Ohm's law, Gauss's Theorem, Ampere's Circuital Law, Digital Electronics, Boolean Algebra, Logic Gates, Combinational and Sequential Circuits, Flip-Flops, Counters.

**(10)**

**Biotechnology:** Cell biology, Tissues, Cellular organelles: Structural organization of Plasma membrane, cell wall, Mitochondria; Structure of DNA and its physico-chemical properties. Prokaryotic and eukaryotic DNA replication- DNA polymerases and proteins involved in DNA synthesis and their specific roles. Transport of nutrients, ions and macromolecules across membranes; Basic concepts in immunology, cells of immune system, innate and acquired immunity, clonal nature of immune response; Organization and structure of lymphoid organs.

**(10)**

**Properties of Materials:** Atomic structure- Atomic bonding in solids- Crystalline state of solids- Unit cells and Space lattices – Crystal structures- Crystal planes and directions- Miller Indices - Diffraction of X-rays by crystal - Bragg's equation - Correction to Bragg's equation - Reciprocal lattice- Crystal Defects- point, line and surface defects. Plastic deformation - Slip - twinning - Critical resolved shear stress - theoretical shear strength of perfect crystal - role of dislocation in plastic deformation - methods of strengthening crystalline materials - strain hardening - grain size - solid solution strengthening - precipitation strengthening - fibre reinforced materials - whiskers - creep - creep curves - mechanism of creep - creep resistant materials. Ductile and brittle fracture - Theoretical cohesive strength of materials - Griffith's theory - Methods of protection against fracture - Fatigue.

**(20)**

**\*\*\*\*Detail schedule of entrance examination  
will be announced very soon.**