Name of Specialization: Nanomaterials in Structural Engineering	
No. of Question: 50 (Objective Type)	
Duration: 1 Hr. 30 Min	Maximum Marks: 50

Synthesis of Nonmaterial using Chemical methods, Mechanical methods.

Characterization Techniques, UV – Visible- NIR - absorption and reflectance Spectroscopy, X- Ray Diffraction studies – Dynamic Light Scattering (DLS), Spectroscopy. - SEM, TEM, Atomic force microscopy (AFM). Fourier Transform Infrared Spectroscopy (FTIR). DSC, Thermo Gravimetric analysis.

Sensor & Transducers, Sensor Characteristics and Physical effects, Active and Passive sensors – Static characteristic: - Accuracy, offset and linearity – Dynamic characteristic: - First and second order sensors – Physical effects involved in signal transduction: - Photoelectric effect – photo-dielectric effect – Photoluminescence effect – electroluminescence effect, Peizo-resistive effect – piezoelectric effect

Nanopolymers – Preparation and characterization, Nano-particles polymer assemblies; Assembly of polymer – Nanoparticles composite material; Fabrication of polymer-mediated organized Nano-particles assemblies; Applications of Nano-polymers in Catalysis.

Yield- Fracture- Rubbery elasticity and viscoelasticity - Composites and nano composites- Surface mechanical properties- Diffusion and permeability- Features of nano composites- Basics of polymer nano composites- Nano reinforcements- Matrix materials.

Theoretical Basics of Carbon Nano tube, Preparation of Carbon Nano-Tubes, Properties of Carbon Nanotubes, Applications of Carbon Nanotubes. Improvement in toughness and fatigue characteristics through incorporation of chemically treated nanotubes into an epoxy. Combination of nanotube based fibres and films. SWNT reinforced fibres etc.

Introduction of nano composites, Properties and features of nano composites, Processing of nano composites, Characterization of nano composites, Applications of nanocomposites

Nanotechnology in Construction, Cement Science, Concrete Science, Powder Materials Used in Cement Concrete, Poly-carboxylic ether based high range water reducing admixtures for use in concrete, their mechanism and specifications. Concrete and binders modified by nano-particles. Nano-Silica and Nano-Binders, Capacity and Durability enhancement with Nano Materials.

Nano Silica and Nano- Cements, Production methods of Nano- Silica (nS), Forms of nS and their Properties, Effects of nS in mortars and concretes, Nano Cement, Commercial Applications.