Certificate Course in Nano Science and Technology

(Contact hours -30 hrs; Max. Marks: 60)

1. Introduction- definition- History (Chapter 1, Book 1)
2. Nanoparticle Synthesis – Solution Combustion of Nanoscale Materials, Sol-gel films (Chapter 5, Book 2, Reference 3)
3. Investigating and Manipulating Materials in the Nanoscale

   Electron Microscopies – Scanning Electron Microscopy, In-situ nano measurements, Scanning Probe Microscopies – Atomic Force Microscopy, Optical Microscopies in Nanoscience and Technology – Confocal Microscopy, Vibrational Spectroscopy, X-ray diffraction, Optical Properties (Chapter 2, Book 1, Chapter 8, Book 2)

4. Laboratory Session:
   1. Preparation of Nanoparticles and Thin films using chemical synthesis methods.
   2. Study of Properties – Structural and Optical Properties.

Books for study:

1. T. Pradeep: Nano The Essentials, Tata McGraw Hill, 2007
2. Guonzhong Cao: Nanostructures and Nanomaterials, Imperial College Press, 2004
3. Arvind Varma, Alexander S. Mukasyan, Alexander S. Rogachev, Khachatur V. Manukyan, “Solution Combustion Synthesis of Nanoscale Materials”, Chem. Rev. 2016, 116, 14493−14586

COURSE OUTCOME

	Module	Outcome
1	Introduction	Introduce the student to basic concepts of nanoscience with a brief historical background
2	Nanoparticle Synthesis	Obtain an idea on chemical route synthesis methods to obtain nano sized particles and thin films.
3	Investigating and Manipulating Materials in the Nanoscale	Get an overall idea on different characterizations are done on nanoparticles and how different properties are studied.
4	Laboratory Sessions	Get hands on experience of synthesizing nanoparticles and studying various properties of the prepared samples.