MEDI-CAPS UNIVERSITY, INDORE

DEPARTMENT OF PHYSICS

Value Added Course

Introduction to Nanotechnology

MODULE -I

Nanomaterials and their synthesis: Introduction to Nanotechnology and Nanomaterials, Introduction to sol-gel synthesis, Demonstration of sol-gel synthesis, Hands-on session for practicing.

MODULE -II

High-resolution digital multimeter: Fundamentals of I-V characterization, Demonstration of high-resolution multimeter using a current and a voltage source, Hands-on practice for the same, Application of nanotechnology in Astro Physics.

MODULE -III

Chemical Vapor Deposition (CVD): Introduction with Furnace, Hands-on practice on furnace programming, Introduction with Chemical Vapor deposition technique, demonstration, and hands-on practice on CVD on a glass substrate, Introduction with conducting polymers and their synthesis.

MODULE -IV

Thin-film preparation using spin-coater: Thin-film preparation and applications, Demonstration of spin-coater for thin-film preparation, Do's and Don'ts while using spin-coater, Hands-on session for practicing and preparing thin films.

MODULE -V

UV-Vis Absorption Spectroscopy: Introduction with absorption spectroscopy and its types, Importance of absorption spectroscopy, Demonstration of UV-Vis spectroscopy, Hands-on session on UV-Vis spectroscopy using different samples.

Text Books

1. A Text Book of Nanoscience and Nanotechnology, T. Pradeep, McGraw Hill Education
2. Nano: The Essentials, Understanding Nanoscience and Nanotechnology, T. Pradeep, McGraw Hill Education.
3. Introduction to Nanotechnology, C.P. Poole and F.J. Ownes, Wiley-India (2007).

Reference Books

1. G Timp (ed), Nanotechnology, AIP Press, Springer (1999).
2. Nano: The Essentials, T. Pradeep, Mc-Graw Hill India (2007).
3. Li, Lin, Ashok Kumar Materials Characterization Techniques Sam Zhang; CRC Press, (2008).
4. Cullity, B. D., and Stock, R.S., "Elements of X-Ray Diffraction", Prentice-Hall, (2001).

Course Outcomes (Cos): After completing this course students shall be able to:

CO_{01}	Understand the nano scale phenomenon and sol-gel synthesis of materials.
CO_{02}	Identify the voltage and current sources and analyse their V-I characteristics.
CO_{03}	Fabricate thin-films using CVD chamber.
CO_{04}	Operate spin-coater and synthesize thin-films.
CO_{05}	Understand the significance of UV-Vis spectroscopy technique and its diverse applications.