

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Name of the Course:

Nano Technology and its applications (900122)

Proposed By:

Dr. Ashok Kumar Sharma

Department:

Applied Science

Credits:

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Course Objectives:

This course is designed to impart fundamental knowledge about nanoscale, nanoscience and nanotechnology. It is planned to provide fundamental ideas about band theory of Nano materials, synthesized and characterization methods, their applications

Unit –I: Definition and importance of nanoscale, Introduction to nanotechnology, generations of nanotechnology.

Unit –II: Dimensions of nanomaterials, Concept of Bohr radius, Idea about wave-corpuscular theory at sub-atomic level, exciton, surface area and volume ratio, quantum mechanical effects and Q-dots, Band theory of nano- materials.

Unit–III: Growth techniques in nano-materials, Top down and Bottom up approaches, Lithographic processes and limitations, plasma arc discharge, sputtering, evaporation, Physical vapour deposition, Chemical vapour deposition , Pulsed laser deposition, Sol-Gel techniques advantages and disadvantages.

Unit–IV: Characterization tools of nanomaterials, Microscopy methods: Scanning probe microscopy (SPM), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), comparison between SEM and TEM, Spectroscopic methods, UV and IR/Visible method.

Unit–V: Applications of nanomaterials: nanoelectronics, medicine, batteries, food and agriculture, environmental protection textile and chemical industry, idea about nanomaterial based products. Hazards of nonmaterial and precautions.

Course Outcomes: Upon successful completion of the course the student will be able to

CO1 Explain about basics Nano science and Nano technology.

CO2 Acquire knowledge about Quantum dots, band theory of Nano materials.

CO3 Develop an understanding about growth techniques of nanomaterials.

CO4 Acquire the Knowledge of TEM, SEM and UV IR instruments.

CO5 Explain about applications of Nano materials in different fields.

Recommended books

1. A textbook of Nano materials by A K Bandyopadhyaya (New age international publishers)
2. Engineering Physics by H K Malik and A K Singh (Mc Graw Hill Education).
3. Physics for engineers by M.R Srinivasan (New age international publishers).
4. Modern physics by R. Murugesan and Er. Kiruthiga Sivaprasath (S Chand and company)

