IV Year B.Tech. Mechanical Engg. I-Semester

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ME433 NANO TECHNOLOGY

(Dept. Elective - IV)

Course Description & Objectives:

This course is intended to develop interest among the students in the area of nano technology and to initiate research inclination and also brings together relevant knowledge from the disciplines of material science, physics and chemistry to give students a fundamental understanding of the integrated multidisciplinary nature of Nanotechnology.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. *understand how basic nanosystems work;*
2. *have a sound grounding and expert knowledge in multidisciplinary areas of nanoscience*
3. *use physical reasoning to develop simple nanoscale models to interpret the behavior of such physical systems*
4. *analyse and critically evaluate ideas/information/data and apply relevant scientific principles to solve problems by, for example, creating hypotheses, testing theories and predictions, designing and carrying out experiments and analysing reported data*
5. *be prepared to work in a high tech work force or pursue a research higher degree in nanotechnology*

UNIT - I Genesis of Nano Technology :

Introduction - Nano Science - Nano technology - Nano materials - Scope of applications - topics from nature - Basic principles of Nano science and technology - Basics of quantum mechanics - Quantum Nano structures.

UNIT - II Fabrication of nano Materials:

Introduction - Nano materials - Properties of Nano materials - Techniques used in Nano technology - Top - Down approach - Bottoms-up approach - Tools used in Nano technology - Electron Micro Scope - Atomic Force Microscope (AFM). Synthesis of Nano materials.

UNIT - III Carbon Nano Tubes(CNT):

Introduction - Preparation - Properties - Classification - Fullerens - Applications of Carbon Nano Tubes.

UNIT - IV Domain Application of Nano Technology:

Introduction - Applications of Nano technology - Environment and Energy - Textiles - Agriculture - Electronics & Communication - Computers - Medicine - Space technology.

UNIT - V Projected use & Implications of Nano Technology:

Introduction - Assessment of opportunities - Bottlenecks in implementation of Nano technology - Exploration and Economical concerns of Nano technology - Current research activity.

TEXT BOOKS :

1. Mark Ratner, “Nano technology”, 3rd ed., Pearson Education, 2008.
2. Manasi Karkare, “Nano Technology Fundamentals and Applications”, 1st ed., I.K. International Publishing House, 2008.

REFERENCE BOOKS :

1. T. Pradeep, “Nano The Essentials”, 3rd ed., McGraw-Hill Education, 2009.
2. A.K. Badyopadhyay, “Nano Materials”, 1st ed., New age International Publications, 2009.