



बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsamunda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

School of Science

B.Sc. (Chemistry) Programme

Subject Code & Name: BS06MICHE2 & NanoScience

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	2	4	25	25	25	25

Programme Name	B.Sc.
Semester	VI
Course Code	BS06MICHE2
Course Title	Nano Science
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	4
Sessions+ Lab. Per Week	4
Total Teaching/Lab. Hours	60 Hours
* 2 Laboratory = 1 Session	

Learning Objectives

1. Grasp the basic principles of Nano chemistry, including the unique physical, chemical and biological properties of material at the Nano scale due to quantum effects and high surface to volume ratios.
2. Study how size, shape and surface chemistry influence the optical, electrical, magnetic and mechanical properties of nanomaterial's.
3. Evaluate the environmental, health and social impacts of nanomaterial's including toxicity, safe handling and ethical considerations.
4. Explain the importance of nanoscale science in modern technology.

Prerequisites (if any)





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Learning Outcomes

On the Completion of this course, students will able to:

1. Explain what nanoscience and nanomaterials are (typically 1–100 nm scale)
2. Understanding of nanomaterial's and Nanotechnology and their chemistry.
3. Knowledge of preparation, materials.
4. Describe how properties change at the nanoscale compared to bulk materials.

Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Introduction to nanomaterial's ➤ Introduction to Nanomaterial's, Optical, magnetic and chemical properties of Nanomaterial's, ➤ Preparation of Nanoparticles: Chemical Approaches: Chemical reduction ➤ Sonochemical synthesis ➤ Sol-Gel Synthesis ➤ Self-assembly.	15
II	Nanostructured and nanomaterial's ➤ Quantum dots, wells & wires ➤ Carbon Nanotubes (CNTs) ➤ Single walled carbon nanotubes (SWNTs), ➤ Multiwalled carbon nanotubes (MWNTs), ➤ Graphenes, Fullerenes Nano rods, Nanotubes and Nanofibres	15

Text Book(s)

1.

Reference Books

1. Introduction to Nanotechnology: Charles P. Poole, Jr. and Frank J. Owens; Wiley Student Edition, 2008
2. Nanostructures and Nanomaterial's: Synthesis, Properties and Applications: G. Cao, ICP, London, 2004.
3. Nano biotechnology, Concepts, Applications and perspectives: C. M. Niemeyer and C. A. Mirkin, WILEY-VCH, Verlag GmbH & Co, 2004.
4. Optical Properties of semiconductor Nano crystals: S. P. Gaponenko, Cambridge University Press, 1980.
5. Nanotechnology: Mark Ratner and Daniel Ratner, Pearson Education.



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Web Resources	
1. Google books, INFLIBNET, Google Web	
Required Software(s) (if any)	
Practical(s) (if any)	
1. Synthesis of different metals nanoparticles.	30
2. Synthesis of nanoparticles using different chemical process	

L:: Lecture, **T::** Tutorial , **P::**Practical

CCE:: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation; slip tests (announced/ surprised), attendance etc. or any combination of these)

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE:: Semester End Evaluation