

**HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN**  
**B. Sc. PHYSICS - SEMESTER – I**  
**TYPE OF COURSE: SKILL ENHANCEMENT COURSE**  
**PROGRAMME CODE: SCIUG101      COURSE CODE:SC23SECPHY106**

**COURSE NAME: INSTRUMENTATION MEASUREMENT AND ANALYSIS**  
(Effective from June 2023 Under NEP – 2020)

Total Credits: 02	Theory	External Marks – 25
Teaching Hours per Week: 02		Internal Marks - 25
Teaching Hours per Semester: 30		

**Course Objective:**

- To understand the principles of various instruments and its application.
- To Learn the concepts Vernier calipers, Micrometer screw, spherometer, spectrometer etc.
- To Understands working function of Galvanometer and determine merit of figure.
- Learns about construction, working and use of various measuring instruments.

**Course outcome:**

At the end of the course students will able to

- Understand the basic knowledge of working of various instruments and its application.
- Learns the construction, working process and use of various measuring instruments.
- Will get sufficient knowledge of Galvanometer and determine various scientific parameters.

:: Syllabus ::

Unit No.	Content	Credit	Hrs 30
Unit-1	<p><b>Vernier Calipers:</b> Introduction, Theory, Figure, Description of the instrument, Detail study of Least count, Errors, Positive error, negative error, Determination of magnitude of positive and negative errors.</p> <p><b>Micrometer Screw:</b> Introduction, Theory, Figure, Description of the instrument, Definition of pitch and its determination, study of least count, Meaning of the error and explanation of positive and negative errors. Determination of positive and negative errors. Method of taking observation with the help of Micrometer Screw.</p> <p><b>Spherometer:</b> Introduction, Theory, Figure, Description of the instrument, To determine the pitch of the screw, To determine the least count of the spherometer, Zero error, Derivation of the formula for the radius of curvature of a curved surface.</p>	1	15
Unit-2	<p><b>Wheatstone Bridge:</b> Introduction, Theory with figure, the figure of meter bridge used in laboratory, construction of Meter bridge. Post-Office box: Introduction, Theory, Circuit Diagram, Theoretical Circuit diagram, explanation of working with necessary formula.</p> <p><b>Galvanometer:</b> Introduction, Theory, Sensitivity and Figure of Merit of Galvanometer.</p> <p><b>Spectrometer:</b> Introduction, Construction and explanation of three main parts of Spectrometer, Mercury Discharge lamp, Sodium Discharge lamp, the adjustment, leveling and the method of recording the observation of Spectrometer.</p>	1	15
<b>Reference:</b> Book for Study: Experimental Book for Physics			

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**B. Sc. PHYSICS - SEMESTER – I**  
**TYPE OF COURSE: SKILL ENHANCEMENT COURSE (SEC)**  
**PROGRAMME CODE: SCIUG101      COURSE CODE:SC23SECPHY107**

**COURSE NAME: INTRODUCTION TO NANOTECHNOLOGY**  
(Effective from June 2023 Under NEP – 2020)

Total Credits: 02	Theory	External Marks – 25
Teaching Hours per Week: 02		Internal Marks - 25
Teaching Hours per Semester:30		

Sr. No	Contain	Credit	Lec. Hrs 30
Unit 1	<p><b>Concept of Nanotechnology:</b>  Nanotechnology, Nano tech Generation, Nano science, New form of Carbon, Nano composites, Polymer Nano composites, Nano materials, Properties of nano materials-, One-, two- and three-dimensional nano materials, Molecular nanotechnology, Nano structured materials by self-assembly, Nano crystals, What nano devices can do in the medical field? Nano pores, nano ionics, nano mechanics, Nano robotics.</p> <p><b>Tools to Make and measure a nano structure:</b>  Tools and Techniques, microscopy, Metrology, Simulation, Carbon Nanotube (CNT) – fabrication, Purification of CNTs, Dispersion, Scanning Probe Microscopes (SPM), Atomic Force Microscopy (AFM), Single Molecule Techniques, Micro lithography and MEMs, Electron beam lithography and focused ion bombardment</p>	1	15
Unit 2	<p><b>Applications of Nanotechnology:</b>  Identified potential applications Expected benefits from nanotechnologies, can nanotechnology help in addressing various challenges, Energy and Energy Efficiency, new energy producers, Medicine, security, Other Applications, Constructions.</p> <p><b>Impact of Nanotechnology:</b>  Societal impact of nanotechnology, Social and ethical impact, Health and environmental impact, Risks with nanotechnology, Indian Scenario in nanotechnology</p>	1	15
<p><b>Reference Book:</b> Nanotechnology: technology Revolution of 21st Century Rakesh Rathi (S. Chand &amp; Company, New Delhi)</p>			
<p><b>Further Reading:</b> Introduction to Nanoscience, S. M. Lindsay (Oxford Press) Nano: The Essentials, T. Pradeep (Tata McGraw Hill)</p>			