SARDAR PATEL UNIVERSITY

NAAC 'A' Grade (10-01-2023 To 09-01-2028)

Vallabh Vidyanagar

Gujarat

Academic Program Structure

&

Curriculum

(Aligned with NEP-2020)

[M.Sc.(Physics)]

NHEQF Level: 6.5

Entry NHEQF Level	:	5.5
Duration	:	Two Years (Four Semesters)
Total Courses	:	32
Total Learning Hours	:	2640
Total Credits	:	88
Total Marks	:	2200

Graduate Attributes (GAs)

Upon successful completion of the programme, graduates are expected to attain the following Graduate Attributes :

GA1. Advanced Disciplinary Knowledge
Apply the advanced and integrated knowledge in a specialized area of study, supported by a strong conceptual understanding of underlying principles, theoretical frameworks, and current developments in the field.

GA2. Critical Thinking and Analysis
Ability to critically examine physical phenomena, evaluate evidence, and connect theoretical concepts with mathematical reasoning to arrive at valid scientific conclusions.

GA3. Problem Solving and Innovation
Analyse and solve complex problems using scientific reasoning and appropriate analytical tools.

GA4. Analytical Reasoning and Application
Analyse experimental and theoretical outcomes and apply findings to related problems.

GA5. Creativity and Innovation
Demonstrate the capacity for creative thinking and innovation, enabling them to develop new ideas, approaches, or solutions in scientific, technological, or professional contexts

GA6. Research and Inquiry Skills
Conduct systematic investigation and inquiry, including formulation of research questions, analysis of data, and interpretation of results using appropriate scientific methods.

GA7. Digital and Computational Competence
Use modern computational tools, information technology, and digital resources effectively for problem solving, research, and professional practice.

GA8. Communication Skills
Communicate ideas, analyses, and conclusions effectively through written, oral, and graphical forms to both specialist and non-specialist audiences.

GA9. Teamwork and Leadership
Integrate to work effectively both independently and collaboratively, contributing constructively to team activities and assuming leadership responsibilities when required.

GA10. Ethics and Professional Responsibility
Demonstrate professional integrity, ethical conduct, and accountability in academic, educational, industrial, or societal contexts.

GA11. Environmental and Sustainability Awareness
Understand environmental and sustainability implications and promote sustainable practices

GA12. Lifelong Learning and Adaptability
Possess the motivation and ability for continuous learning, intellectual curiosity, and professional development, enabling them to adapt to emerging knowledge, technologies, and interdisciplinary challenges.

Programme Educational Objectives (PEOs):

Within 2–3 years of completing the programme, graduates will be able to:

PEO1 Graduates will establish careers in education, research, and industry by applying advanced knowledge of physics.

PEO2 Graduate will apply principles of physics, mathematical reasoning, and computational tools to analyze and solve scientific or technological problems in professional practice.

PEO3 Graduates will contribute to teaching and dissemination of scientific knowledge using effective communication strategies.

PEO4 Graduate will demonstrate professional integrity in academic and industrial contexts.

PEO5 Graduate will engage in continuous learning and skill development to adapt to emerging technologies, and interdisciplinary opportunities.

PEO6 Graduate will apply scientific knowledge responsibly to address societal challenges and support environmentally sustainable development.

Program Learning Outcomes (PLOs):

Upon successful completion of the programme, learners will be able to:

PLO1 Demonstrate advanced knowledge and critical understanding of core and specialized areas of physics, including quantum mechanics, electrodynamics, condensed matter physics, electronics and communication and emerging fields in materials physics, computational physics, and energy science.

PLO2 Employ sophisticated mathematical methods with proficiency to solve various physical systems analytically with enhanced precision.

PLO3 Analyze complex physical problems using logical reasoning, mathematical formulation, computational tools, and data analysis, and evaluate scientific arguments using evidence-based reasoning.

PLO4 Design experiments, operate advanced equipment, control variables, perform calibration, uncertainty analysis, minimize errors and adhere to safety protocols in laboratories.

PLO5 Employ statistical methods, error analysis, and visualization techniques to extract insights from experimental or simulated data and validate conclusions rigorously.

PLO6 Evaluate synthesis and characterization techniques for size dependent properties of materials for their industrial and environmental applications.

PLO7 Design and assess materials along with simulations for modern device applications.

PLO8 Enhance computational proficiency for solving research, industrial and societal problems as well as develop new methodologies and/or processes for their analyses and solutions.

PLO9 Undertake competency in the foundational principles of physics and examine the interface of physical and life sciences.

PLO10 Design and develop renewable energy solutions and energy management strategies for real- world applications.

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NEP-2020 aligned Curriculum with effect from Academic Year 2026-27

[M.Sc.(Physics)]

Semester-I

Course Type	Course Code	Course Title	Teaching-Learning Scheme		Credits	Assessment Scheme & Marks				
			L-P-T	Total Notional Hours		Internal Assessment			External Assessment	Total Marks
						FA	SA	Total		
DSC	**P2S01NCPHY01**	Mathematical physics and Quantum mechanics	4-0-0	120	4	25	25	50	50	100
DSC	**P2S01NCPHY02**	Classical and Statistical mechanics	4-0-0	120	4	25	25	50	50	100
DSC	**P2S01NCPHY03**	Solid State Physics and Solid State Electronics	4-0-0	120	4	25	25	50	50	100
DSC	**P2S01NCPHY04**	Practical – I	0-8-0	120	4	25	25	50	50	100
DSC	**P2S01NCPHY05**	Practical – II	0-8-0	120	4	25	25	50	50	100
DSC	**P2S01NCPHY06**	Computational techniques for Physics	1-2-0	60	2	15	10	25	25	50
				660	**22**	**140**	**135**	**275**	**275**	**550**

DSC: Discipline Specific Core **DSE**: Discipline Specific Elective **L**: Lecture **P**: Practical **T**: Tutorial

FA: Formative Assessment **SA**: Summative Assessment

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Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme		Credits	Assessment Scheme & Marks				
			L-P-T	Total Notional Hours		Internal Assessment			External Assessment	Total Marks
						FA	SA	Total		
DSC	**P2S02NCPHY01**	**Nuclear and particle physics**	4-0-0	120	4	25	25	50	50	100
DSC	**P2S02NCPHY02**	**Electrodynamics and atomic and molecular physics**	4-0-0	120	4	25	25	50	50	100
DSC	**P2S02NCPHY03**	**Quantum mechanics and Solid State Physics**	4-0-0	120	4	25	25	50	50	100
DSC	**P2S02NCPHY04**	**Practical – I**	0-8-0	120	4	25	25	50	50	100
DSC	**P2S02NCPHY05**	**Practical – II**	0-8-0	120	4	25	25	50	50	100
DSC	**P2S02NCPHY06**	**Analog and digital ICs**	1-2-0	60	2	15	10	25	25	50
				660	**22**	**140**	**135**	**275**	**275**	**550**

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