



SARDAR PATEL UNIVERSITY

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

Vallabh Vidyanagar

Gujarat

Academic Program Structure

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Curriculum

(Aligned with NEP-2020)

M.Sc. Electronics

NHEQF Level: 6.5

Entry NHEQF Level	:	6.0
Duration	:	Two Years (Four Semesters)
Total Courses	:	24
Total Learning Hours	:	2640
Total Credits	:	88
Total Marks	:	2200



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Graduate Attributes (GAs):

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

- GA1: Demonstrate Advanced, Ethical and Sustainable Knowledge in Electronics and Systems**
Demonstrate advanced and integrated knowledge of electronics, including semiconductor devices, communication systems, embedded systems, and VLSI technologies, with consideration of ethical practices, environmental impact, and responsible technology use.
- GA2: Apply Analytical and Modelling Techniques to Solve Complex Problems**
Apply mathematical analysis, circuit/system modelling, and simulation tools (e.g. pSPICE) to formulate and solve complex electronics problems, demonstrating accuracy through validated results and performance metrics.
- GA3: Design and Implement Scalable Electronic Systems**
Design, simulate, and implement electronic systems using modern tools (e.g., EDA tools, embedded platforms) to meet specified functional, performance, cost, and scalability requirements, validated through testing and prototyping.
- GA4: Perform Experimental and Practical Investigations**
Demonstrate high-level competence in laboratory experiments, fabrication processes, and hardware implementation aligned with industry standards.
- GA5: Integrate Multidisciplinary Knowledge to Develop Holistic Solutions**
Integrate concepts from electronics, computing, materials science, and communication systems to design and develop solutions for real-world problems, demonstrating effectiveness through functional prototypes, simulations, or validated performance outcomes.
- GA6: Develop Industry - Ready Competence with Ethical and Sustainable Practices**
Exhibit competencies aligned with global industry requirements, including embedded systems, automation, IoT, VLSI, and emerging technologies, ensuring responsible innovation, ethical compliance, and sustainable engineering practices.
- GA7: Practice Ethical and Professional Responsibility**
Uphold ethical standards, professional integrity, and responsible conduct in scientific practice, research, and technology deployment.
- GA8: Communicate Technical and Scientific Information Effectively**
Communicate complex scientific and technical concepts effectively through professional documentation and presentations.
- GA9: Demonstrate Leadership and Teamwork Skills**
Demonstrate leadership, teamwork, and project management skills in multidisciplinary and multicultural environments.
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GA10: Engage in Lifelong Learning and Adaptability

Engage in continuous professional development and adapt to rapidly evolving technologies and global scientific advancements.

GA11: Promote Sustainability and Societal Responsibility

Apply scientific and technological knowledge to develop sustainable solutions that address societal needs and environmental challenges.

GA12: Contribute to Global and National Development

Understand and contribute to global scientific and technological advancements while addressing national priorities and societal development goals.

Programme Educational Objectives (PEOs):

Within 3–5 years of completing the programme, graduates will be able to:

PEO1: Design, analyze, and optimize analog, digital, and mixed-signal electronic systems by integrating modern engineering principles with foundational concepts of material behavior, logic, and system thinking inspired by Indian Knowledge Systems.

PEO2: Develop embedded systems, VLSI architectures, and intelligent electronic solutions for emerging applications (IoT, AI, Industry 4.0), incorporating structured reasoning, algorithmic thinking, and system-level insights derived from both contemporary and traditional knowledge frameworks.

PEO3: Engage in interdisciplinary research and innovation by synthesizing modern electronics with traditional Indian scientific thought, contributing to knowledge creation in advanced domains and promoting contextually relevant technological solutions.

PEO4: Establish and lead technology ventures by developing innovative, sustainable, and socially responsible electronic solutions, guided by ethical values, ecological awareness, and principles of balance and harmony emphasized in IKS.

PEO5: Contribute effectively as educators, trainers, and academic leaders by integrating scientific knowledge with logical reasoning traditions (e.g., Nyāya) and holistic pedagogical approaches for enhanced learning outcomes.

PEO6: Demonstrate leadership in multidisciplinary environments by applying ethical practices, sustainability principles, and consciousness-based perspectives in engineering design, decision-making, and societal applications.

PEO7: Pursue continuous learning and professional growth by adapting to emerging technologies while appreciating and integrating insights from Indian Knowledge Systems into modern scientific and engineering practices.



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Program Learning Outcomes (PLOs):

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

- PLO1:** Analyze and solve complex electronics problems using scientific and engineering principles along with conceptual insights into matter, energy, and systems inspired by classical Indian scientific thought (e.g., atomic theory, energy flow).
- PLO2:** Design and optimize electronic circuits and systems using structured logic, inference, and decision-making frameworks aligned with both modern digital design and classical reasoning systems (Nyāya logic).
- PLO3:** Develop embedded and SoC-based systems by applying algorithmic thinking, combinatorics, and structured programming approaches, including parallels with traditional knowledge systems,
- PLO4:** Apply modern tools (SPICE, EDA, simulation platforms) for modeling and evaluation, while understanding systems through input–process–output frameworks and holistic system perspectives.
- PLO5:** Conduct experiments and validate system performance by integrating modern laboratory techniques with insights into material behavior, metallurgy, and controlled processes reflected in traditional practices.
- PLO6:** Design communication and signal processing systems by understanding signals, frequency, and wave propagation as structured vibrations, drawing parallels with traditional knowledge of sound and resonance.
- PLO7:** Design and evaluate solutions in emerging areas (VLSI, IoT, AI, edge computing) using interdisciplinary approaches that integrate modern engineering with system thinking and holistic design principles.
- PLO8:** Communicate technical ideas effectively through reports, presentations, and documentation using clarity, structured reasoning, and logical articulation.
- PLO9:** Apply ethical principles, environmental awareness, and sustainability practices in system design, guided by concepts such as balance (Samatva), harmony, and responsible innovation.
- PLO10:** Work effectively in teams and lead projects by integrating multidisciplinary knowledge and adopting system-level thinking inspired by both modern engineering and traditional holistic models.
- PLO11:** Engage in self-directed learning and continuously upgrade skills while integrating modern technological advancements with insights from Indian Knowledge Systems for innovation and societal benefit.



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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	P2S01NCELE01	Semiconductor Electronics: Devices and Applications	3-0-1	120	04	20	30	50	50	100
DSC	P2S01NCELE02	Integrated Circuit Applications and Intelligent Electronics	3-0-1	120	04	20	30	50	50	100
DSE (Any Two)	P2S01NEELE01	Microcontroller Systems: Architecture, Interfacing and Programming	3-0-1	120	04	20	30	50	50	100
	P2S01NEELE02	Advanced Network Analysis	3-0-1	120	04	20	30	50	50	100
	P2S01NEELE03	Biomedical and Analytical Instruments								
DSC	P2S01NCELE03	Practicals	0-8-1	120	04	20	30	50	50	100
DSC	P2S01NCELE04	Project Work	0-2-0	60	02	10	15	25	25	50
				660	22			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	P2S02NCELE01	Electromagnetics and Antenna Technology	3-0-1	120	04	20	30	50	50	100
DSC	P2S02NCELE02	Microprocessors and Systems on Chip (SoC)	3-0-1	120	04	20	30	50	50	100
DSE (Any Two)	P2S02NEELE01	C++ for Microcontrollers and Firmware	3-0-1	120	04	20	30	50	50	100
	P2S02NEELE02	Power Electronics and Industrial Automation	3-0-1	120	04	20	30	50	50	100
	P2S02NEELE03	Advanced Electronic Devices, Microwave and Quantum Systems with IKS Perspectives								
DSC	P2S02NCELE03	Practicals	0-8-1	120	04	20	30	50	50	100
DSC	P2S02NCELE04	Project Work	0-5-0	60	02	10	15	25	25	50
				660	22			275	275	550

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