

Proposal for B.Tech. (Diploma to Degree)/M. Tech.

In

Mechatronics /Electrical (Upskilling Program) for TDSG , Becharaji , Gujarat

By

Ganpat University – U.V. Patel College of Engineering (GUNI-UVPCE)

1. Introduction

Ganpat University, through its constituent college U.V. Patel College of Engineering (GUNI - UVPCE), proposes a specialized Diploma to Degree (D2D) B.Tech. Mechatronics/Electrical engineering, and M.Tech. Mechatronics/Electrical engineering (Upskilling Program) for working professionals at TDSG, Becharaji. This initiative is strategically designed to address the upskilling needs of diploma engineers & degree engineers, aligning with the evolving demands of manufacturing/automotive industries and the growing focus on automation and smart manufacturing.

2. About Ganpat University

Ganpat University is a distinguished institution recognized for its commitment to academic excellence and innovation. It holds an "A Grade" accreditation from the National Assessment and Accreditation Council (NAAC) with a CGPA of 3.11, valid until 2029. The university has earned a prestigious 5-Star rating under the Gujarat State Institutional Ranking Framework (GSIRF) and has been awarded the Diamond Rating by QS I-GAUGE, reflecting its high standards in quality education. Additionally, Ganpat University is designated as a Center of Excellence by the Government of Gujarat and has received a 4-Star rating from the Ministry of Education's Institute Innovation Council, underscoring its dedication to fostering innovation and industry-oriented learning. These accolades collectively highlight Ganpat University's role as a leading center for professional and technical education.

3. About TDSG Ltd.

TDSG Ltd., established in 1985, is India's leading manufacturer of automotive air conditioning systems and thermal products. A joint venture with Denso Corporation and Suzuki Motor Corporation, TDSG serves major clients such as Maruti Suzuki, Tata Motors,

Mahindra, Ashok Leyland, and Indian Railways. With a robust R&D center and manufacturing plants nationwide, TDSG is expanding into transport refrigeration, railways, and residential AC components, and is focused on sustainable, innovation-driven growth.

4. About Ganpat University - U.V. Patel College of Engineering (GUNI - UVPCE)

Ganpat University-U. V. Patel College of Engineering (GUNI-UVPCE) is situated in Ganpat Vidyanagar campus. It was established in September 1997 with the aim of providing educational opportunities to students from various strata of society. It is one of the constituent colleges of Ganpat University. It is a self-financed institute approved by All India Council for Technical Education (AICTE), New Delhi and the Commissionerate of Technical Education, Government of Gujarat. The College is spread over 25 acres of land and is a part of Ganpat Vidyanagar Campus. It has six ultra-modern buildings of architectural splendor, class rooms, tutorial rooms, seminar halls, offices, drawing hall, workshop, library, well equipped departmental laboratories and several computer laboratories with internet connectivity through 1 Gbps Fiber link, satellite link education center with two-way audio and one-way video link. The superior infrastructure of the Institute is conducive for learning, research, and training. The Institute offers various undergraduate programs, postgraduate programs, and Ph.D. programs.

Vision

To be a leading institution that meets the educational needs of youth in professional studies, providing state-of-the-art learning opportunities and inculcating values of commitment and uprightness.

Mission

- Seek, search, and offer programs that foster the symbiotic emergence of academic excellence and industrial relevance in education and research.
- Deliver global standards of excellence, remaining accountable for national values and continuous improvement.
- Prepare students to be leaders with vision, zeal, passion, and confidence, equipped with knowledge and skills to succeed in the engineering profession.

5. Justification for Offering B.Tech Programmes (Mechatronics / Electrical Engineering) for Employees (Diploma holders) of TDSG ?

Background and Industry Relevance

The rapid growth of the Lithium-ion battery industry—driven by electric vehicles (EVs), renewable energy storage systems, consumer electronics, and grid-scale applications—has created a strong demand for technically skilled manpower with multidisciplinary engineering competencies. Battery manufacturing involves complex integration of electrical systems, automation, control, precision mechanics, power electronics, and quality assurance, which aligns closely with the curricula of Mechatronics Engineering and Electrical Engineering. Offering B.Tech programmes tailored for working professionals from battery manufacturing industries will support skill upgradation, workforce retention, productivity enhancement, and alignment with national initiatives such as *Make in India*, *Atmanirbhar Bharat*, and *National Electric Mobility Mission*.

Suitability of B.Tech in Mechatronics Engineering

1. Alignment with Battery Manufacturing Processes

Lithium-ion battery manufacturing is a highly automated process involving:

- Cell assembly lines
- Robotic handling systems
- Precision mechanical systems
- Sensors and actuators
- PLC-based control systems

Mechatronics Engineering integrates mechanical engineering, electronics, control systems, robotics, and automation, making it highly relevant for employees involved in:

- Automated production lines
- Equipment maintenance and calibration
- Process optimization and defect reduction

2. Industry-Oriented Skill Development

The programme equips employees with competencies in:

- Industrial automation and robotics
- PLC, SCADA, and embedded systems
- Machine vision and quality inspection
- Predictive maintenance and Industry 4.0 concepts

These skills directly enhance manufacturing efficiency, safety, and consistency in battery production environments.

3. Support for Smart Manufacturing

With the adoption of smart factories and digital manufacturing in battery plants, mechatronics professionals play a key role in:

- Integrating cyber-physical systems
- Implementing real-time monitoring and control
- Reducing downtime and energy consumption

Thus, the programme supports technological transformation of battery manufacturing units.

Suitability of B.Tech in Electrical Engineering

1. Core Relevance to Battery Technology

Electrical Engineering forms the backbone of lithium-ion battery systems, covering:

- Battery management systems (BMS)
- Power electronics and converters
- Electrical testing and validation
- Charging and discharging systems

Employees working in battery manufacturing, testing, and integration benefit directly from advanced knowledge in:

- Electrical circuits and machines
- Power systems and protection
- Energy storage technologies

2. Integration with EV and Energy Storage Applications

Lithium-ion batteries are central to:

- Electric vehicles
- Renewable energy storage
- Grid-connected power systems

The Electrical Engineering programme strengthens employee capability in:

- EV powertrain and charging infrastructure
- Grid integration of battery energy storage systems
- Power quality and efficiency improvement

3. Quality, Safety, and Compliance

Battery manufacturing requires strict adherence to electrical safety standards, testing protocols, and compliance norms. The programme enhances employee expertise in:

- Electrical safety and insulation coordination
- Fault diagnosis and protection systems
- Standards and regulatory requirements

This contributes to product reliability and workplace safety.

6. B.Tech. Mechatronics / Electrical Program: Structure & Highlights

Program Overview

- **Eligibility:** Diploma holders in relevant engineering disciplines.
- **Duration:** Typically, 3 years (lateral entry to second year).

- **Mode:** Blended learning with offline sessions (weekends/holidays/evenings) and online modules.
- **Assessment:** Industry-friendly evaluation system, including project-based and work-integrated assessments.

Curriculum Highlights

Programme	Key Curriculum Highlights
B.Tech Mechatronics Engineering (MTE)	<ul style="list-style-type: none"> • Integrated Mechanical, Electrical & Electronics Engineering • Industrial Automation, PLC, Sensors & Actuators • Robotics, Control Systems & Embedded Systems • CAD/CAM, Solid Modelling & Manufacturing Systems • Industry 4.0, Smart Manufacturing & Mechatronics Labs
B.Tech Electrical Engineering (EE)	<ul style="list-style-type: none"> • Electrical Circuits, Machines & Power Systems • Power Electronics & Drives • Control Systems & Electrical Measurements • Renewable Energy & Energy Storage Systems • Electric Vehicles, Battery Systems design & Charging Infrastructure

- **Hands-on Labs:** Access to advanced labs and simulation tools.
- **Industry Projects:** Real-world projects in collaboration with **TDSG** supervisors.
- **Skill Development:** Training in CAD/CAM, automation software, and programming (e.g., Python, C).

7. Key Features & Benefits

- **Flexible Learning:** Designed for working professionals—no disruption to employment.

- **Industry-Aligned Curriculum:** Co-created with **TDSG** input to address specific manufacturing and automation needs.
- **Work-Integrated Learning:** Internships, apprenticeships, and live projects at **TDSG's** Bechraji Plant.
- **Career Advancement:** Clear pathway from diploma to degree, supporting promotions and new responsibilities.
- **Recruitment Support:** Access to Ganpat University's talent pool for future hiring needs.
- **Social Impact:** Supports professional growth for employees from diverse backgrounds.

8. Collaboration Models

- **Custom Upskilling Modules:** Short-term certifications in automation, robotics, or other relevant fields as needed.
- **Recruitment & Placement:** Assistance in identifying and training diploma engineers for TDSG.
- **Internship Opportunities:** Final-year internships for Ganpat University students at TDSG, building a future-ready talent pipeline.
- **Continuous Feedback:** Ongoing program refinement based on TDSG's evolving needs.

9. Implementation Plan

1. **Needs Assessment:** Joint analysis with TDSG's HR and technical teams.
2. **Curriculum Co-Development:** Align course content with TDSG's technology roadmap.
3. **Program Launch:** Enroll eligible employees / apprentices and commence blended learning.
4. **Monitoring & Improvement:** Formation of joint monitoring committee & regular reviews and feedback for continuous enhancement.